Mullard Data Book 1971/2

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MULLARD DATA BOOK
1971–72

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FOREWORD

This issue of the Data Book gives abridged data on the extensive range of Mullard valves, picture tubes, semiconductors and components used in the consumer electronics industry, concisely listed under type number in alpha-numerical sequence. Each product section has again been printed on different coloured paper to facilitate quick reference.

May we remind you that in order to make way for new types, it has been necessary to omit some of the earlier devices, and we would therefore recommend you to retain copies of earlier issues for your future reference.

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LETTER SYMBOLS AND ABBREVIATIONS

1. Base and Connections:

a	Anode
B	Base
C	Collector
d	Drain
E	Emitter
f	Filament
f+	Filament positive
f–	Filament negative
fct	Filament centre tap
g	Grid, Gate
h	Heater
hct	Heater centre tap
htap	Heater tap
IC	Internal connection (must not be connected externally)
k	Cathode
M	Metallising (external) or base sleeve
NC	No connection
NP	No pin
s	Internal shield, Source
t	Fluorescent screen or target

NOTE 1 – In valves or tubes having more than one grid or anode, the electrodes are distinguished by numbers: g1, g2, etc., g1 being the grid nearest the cathode.

NOTE 2 – In multiple valves, electrodes of the different sections are distinguished by adding one of the following letters:

Diode	d
Triode	t
Pentode	p
Hexode, Heptode, Octode	h

Thus the grid of the triode section of a triode pentode is denoted by gt.

NOTE 3 – Two or more similar electrodes which cannot be distinguished by any of the above means are denoted by adding one or more primes to indicate of which electrode system the electrode forms a part. Thus, the anode of the first diode in a double diode valve is denoted by a'. In colour picture tubes the suffixes B, G, R are used to denote blue, green, and red guns.

2. Characteristics:

f	Frequency
gc	Conversion conductance
gm	Mutual conductance
hfe	Small signal current amplification factor (common emitter)
hFEL	Large signal current amplification factor (common emitter)
Ia	Anode current
ia(pk)max.	Maximum peak anode current
Ia(av)max.	Maximum mean anode current
IC	Collector current
ICBO	Collector cut-off current (common base)
If	Filament current
Ig2	Screen-grid current
Ig2+g4	Screen-grid current (frequency changers)
Ih	Heater current
Iout max.	Maximum output current
It	Target current (tuning indicators)
pa max.	Maximum anode dissipation
Ptot max.	Maximum total dissipation
P.I.V. max.	Maximum peak inverse voltage
Pout	Power output
ra	Anode impedance
Ra	Anode load
Tamb	Ambient temperature
Va	Anode voltage
va(pk)max.	Maximum peak anode voltage
Vb	Supply voltage
VCE	Collector-emitter voltage
VCB	Collector-base voltage
Vf	Filament voltage. D.C. forward voltage

Vg1	Negative grid voltage
Vg2	Screen-grid voltage
Vg2+g4	Screen-grid voltage (frequency changers)
Vh	Heater voltage
vh–k(pk)max.	Maximum peak voltage between heater and cathode
μ	Amplification factor
θj-amb θj-case	Thermal resistance

3. Other Abbreviations:

Hz	Unit of frequency (formerly 1c/s)
kHz	Unit of frequency (formerly 1kc/s)
MHz	Unit of frequency (formerly 1 Mc/s)
nF	Unit of capacitance (1nF=0·001μF =1000pF)

SEMICONDUCTOR DEVICE TYPE NOMENCLATURE SYSTEM

All new Mullard semiconductor devices are registered internationally with Pro-Electron and have type numbers according to the following code, based on the Pro-Electron type nomenclature system for semiconductor devices.

The type number of a semiconductor device intended primarily for use in consumer applications (radio and television receivers, audio amplifiers, tape recorders, domestic appliances, etc.) consists of two letters followed by three figures.

The first letter indicates the semiconductor material used:

A	germanium
B	silicon

The second letter indicates the general application or construction of the device:

A	detector diode
C	transistor for a.f. applications (not power types)
D	power transistor for a.f. applications
F	transistor for r.f. applications (not power types)
T	power thyristor (controlled rectifier)
U	power transistor for switching applications
Y	rectifier diode, booster diode

The group of three figures is a serial number indicating a particular design or development.

Examples:

AA119	Germanium diode for use as a detector
BF167	Silicon transistor for r.f. applications

OLD SYSTEM

Earlier semiconductor devices have type numbers consisting of two letters followed by two or three figures.

The first letter is 'O', denoting a semiconductor device.

The second letter indicates the general class of device:

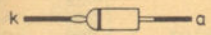
A	diode or rectifier
C	transistor

The group of figures is a serial number denoting a particular design or development.

Examples:

OA91	Semiconductor diode
OC170	Transistor

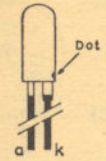
AA119 Germanium point-contact diode.



At Tamb	25	60	°C
Max. reverse voltage			
Peak	45	45	V
*Average	30	30	V
Max. forward current			
Peak	100	100	mA
*Average	35	15	mA
Ambient temperature range			
Max.		+60	°C
Min.		−55	°C

*Averaged over any 50ms period or d.c. component.

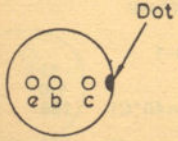
AA129 Germanium junction diode (Bias voltage stabiliser).



At Tamb=25°C		
*Vf	175 to 230	mV
*Temperature coefficient	−2·3	mV/deg C
If max.	20	mA
Tj max.		
Continuous operation	75	°C
Intermittent operation	90	°C
θj-amb	0·5	deg C/mW

*If=5 mA.

AC107 Germanium p-n-p alloy junction transistor. For use in low noise audio applications.

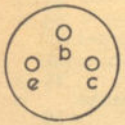


Construction: SO–2/SB3–2 (Glass body)		
VCB max.	−15	V
VCE max. (cut-off)	−15	V
IC (AV) max.	5	mA
Ptot max. (Tamb=25°C)	80	mW
*Noise figure (Typ.)	3·0	dB
hfe (Typ.) IC=300 μA	60	

*VCB=−5V, IE=300 μA: RS=1·5 kΩ.
Bandwidth 30 Hz to 15 kHz.

AC126

Germanium p-n-p alloy junction transistor. For use in pre-amplifier and driver stages.

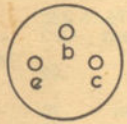


Construction: TO–1		
VCB max.	−32	V
VCE max.	−32	V
IC max.	100	mA
Ptot max. (Tj=75°C)	500	mW
hFE	140	
ICBO (VCE=−10 V; IE=0)	<10	μA
*Noise figure	4	dB

*VCB=−5 V; IE=0·5 mA; f=1 kHz; RS=500 Ω.

AC127

Germanium n-p-n high-gain transistor. For use in complementary symmetrical class 'B' output stages.



Construction: TO–1		
VCB max. (IE=0)	+32	V
ICM max.	500	mA
Ptot max. (Tamb=25°C)	340	mW
hFE (Typ) IC=500 mA	50	
*Noise figure (Typ.)	4	dB

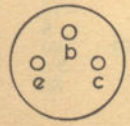
*VCB=+5 V; IE=500 μA; f=1 kHz.

AC127Z VCER=50 V.

AC128

2–AC128

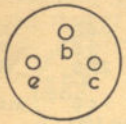
Germanium p-n-p high-gain transistor. For use in class 'A' and 'B' output stages. Matched pair.



Construction: TO–1		
VCB max. (IE=0)	−32	V
ICM max.	1·0	A
Ptot max. (Tamb=45°C)	155	mW
hFE (IE=300 mA; VCB=0)	60 to 175	
ICBO (VCB=−10 V; IE=0)	10	μA

AC176

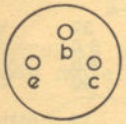
Germanium n-p-n alloy-junction high-gain transistor. For use in mains operated audio amplifiers with class 'B' output stages.



Construction: TO–1		
VCB max.	+32	V
ICM max.	1·0	A
Ptot max. (Tamb=45°C)	155	mW
hFE (IE=−500 mA; VCB=0)	52 to 180	
ICBO (VCB=10 V; IE=0)	12·5	μA

AC187

Germanium n-p-n alloy-junction transistor. With type AC188 it forms a symmetrical complementary pair for use in class 'B' output stages with output power of up to 3 watts.

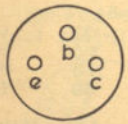


Construction: TO–1		
VCB max.	25	V
VCE max.	15	V
ICM max.	2·0	A
Ptot max. (Tamb ⩽45°C)	0·8	W
*hFE (Typ.)	200	
†fT (Typ.)	5	MHz
ICBO (VCB=10 V; IE=0)	15	μA
Tj max.	90	°C

*IC=−300 mA; VCE=−1·0 V.
†IC=−10 mA; VCE=−2·0 V.

AC188

Germanium p-n-p alloy-junction transistor. With type AC187 it forms a symmetrical complementary pair for use in class 'B' output stages with output power of up to 3 watts.



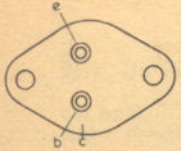
Construction: TO–1		
VCB max.	25	V
VCE max.	15	V
ICM max.	2·0	A
Ptot max. (Tamb ⩽45°C)	0·8	W
*hFE (Typ.)	200	
†fT (Typ.)	1·5	MHz
ICBO (VCB=25 V; IE=0)	20	μA
Tj max.	90	°C

*IC=−300 mA; VCE=−1·0 V.
†IC=−10 mA; VCE=−2·0 V.

AD149

2–AD149

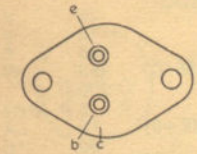
Germanium p-n-p alloy-junction transistor. For use in class 'B' push-pull output stages. Matched pair.



Construction: TO–3		
VCB max.	−50	V
ICM max.	3·5	A
Ptot max. (Tamb=50°C)	22·5	W
ICBO (VCB=14 V; IE=0; Tj=100°C)	4·5	mA
hFE (IC=1·0 A)	30 to 100	

AD161

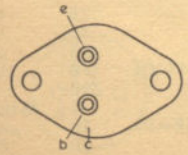
Germanium n-p-n alloy junction transistor. With type AD162 it forms a symmetrical complementary pair for use in mains driven output stages of amplifiers and radio receivers.



Construction: SO–55/SB2–5		
VCBO max.	32	V
ICM max.	3·0	A
Ptot max. (Tamb ⩽72°C)	4·0	W
Tj max. (operating)	90	°C
fT Typ. (VCE=+2 V; IC=10 mA)	3	MHz
hFE (VCE=+1 V; IC=500 mA)	80 to 320	
ICBO (VCB=+10V; IE=0; Tj=90°C) max.	2·6	mA

AD162

Germanium p-n-p alloy junction transistor. With type AD161 it forms a symmetrical complementary pair for use in mains driven output stages of amplifiers and radio receivers.



Construction: SO–55/SB2–5		
VCBO	−32	V
ICM max.	3·0	A
Ptot max. (Tamb ⩽62°C)	3·0	W
Tj max. (operating)	90	°C
fT Typ. (−VCE=2·0 V; −IC=10 mA)	1·5	MHz
hFE (−VCE=1·0 V; −IC=500 mA)	80 to 320	
ICBO (−VCB=32 V; −IE=0; Tj=90°C) max.	2·0	mA

AF114

Germanium p-n-p alloy-diffused junction transistor. For use as an r.f. amplifier in a.m. and f.m. receivers.

interlead shield and metal case

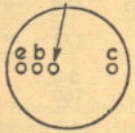
Construction: TO–7		
VCB max. (IE−0)	−20	V
ICM max.	10	mA
Ptot max. (Tamb ⩽45°C)	50	mW
ft (IE=1 mA; VCB=−6 V) Typ.	75	MHz
*Cobs (IE=1 mA; VCB=−6 V) Typ.	2·5	pF

At frequencies below 10·7 MHz the feedback capacitance in common emitter (Coes) is approx. 3·5 pF at IE=1 mA VCE=−6 V
*f=100 MHz.

AF115

Germanium p-n-p alloy-diffused junction transistor. For use as a mixer/oscillator for a.m./f.m. and short wave a.m. receivers.

interlead shield and metal case



*f=100 MHz

Construction: TO–7		
VCB	−20	V
ICM max.	10	mA
Ptot max. (Tamb=45°C)	50	mW
*Cobs (VCB=−6 V; IE=1 mA) Typ.	2·5	pF
fT (VCB=−6 V; IE=1 mA) Typ.	75	MHz
Power gain (f=100 MHz)	13	dB
hfe	150	

AF116

Germanium p-n-p alloy-diffused junction transistor. For use as an i.f. amplifier in f.m. receivers.

interlead shield and metal case

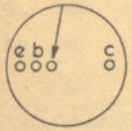
*f=10·7 MHz.

Construction: TO–7		
VCB	−20	V
ICM max.	10	mA
Ptot max. (Tamb=45°C)	50	mW
*Cobs (VCE=−6 V; IE=1 mA)	3·5	pF
fT (VCB=−6 V; IE=1 mA) Typ.	75	MHz
Power gain (f=10·7 MHz)	25	dB
hfe	150	

AF117

Germanium p-n-p alloy-diffused junction transistor. For use as a mixer/oscillator and i.f. amplifier in m.w. and l.w. a.m. receivers.

interlead shield and metal case



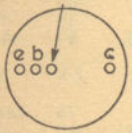
Construction: TO–7		
VCB	−20	V
ICM max.	10	mA
Ptot max. (Tamb=45°C)	50	mW
*Cobs (VCE=−6 V; IE=1 mA)	4·0	pF
fT (VCB=−6 V; IE=1 mA) Typ.	75	MHz
Power gain (f=450 kHz)	42	dB
hfe	150	

*f=450 kHz.

AF118

Germanium p-n-p alloy-diffused transistor. For use as a video amplifier in television receivers.

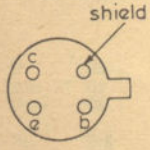
interlead shield and metal case



Construction: TO–7		
VCB max. (IE=0)	−70	V
ICM max.	30	mA
Ptot max. (Tamb=45°C)	250	mW
fT (VCB=−6 V; IE=10 mA) Typ.	175	MHz
ICBO (VCB=−6 V; IE=0) max.	6·0	μA
hFE (Typ.)	180	

AF124

Germanium p-n-p alloy-diffused junction transistor. For use as an r.f. amplifier in a.m. and f.m. receivers.

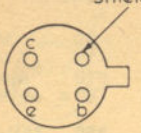


Construction: TO–72		
VCB max. (IE=0)	−20	V
ICM max.	10	mA
Ptot max. (Tamb=30°C)	60	mW
fT (VCB=−6 V; IE=1 mA) Typ.	75	MHz
*Cobs (VCB=−6 V; IE=1 mA)	2·5	pF

At frequencies below 10·7 MHz the feedback capacitance in common emitter (Coes) is approx. 3·5 pF at IE=1 mA; VCE=−6 V.
*f=100 MHz.

AF125

Germanium p-n-p alloy-diffused transistor. For use as a mixer oscillator in a.m./f.m. and shortwave receivers.

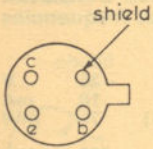


Construction: TO–72		
VCB max. (IE=0)	−20	V
ICM max.	10	mA
Ptot max. (Tamb=30°C)	60	mW
fT (VCB=−6 V; IE=1 mA) Typ.	75	MHz
*Cobs (VCB=−6 V; IE=1 mA) Typ.	2·5	pF

At frequencies below 10·7 MHz the feedback capacitance in common emitter (Coes) is approx. 3·5 pF at IE=1 mA; VCE=−6 V.
*f=100 MHz.

AF126

Germanium p-n-p alloy-diffused transistor. For use as an i.f. amplifier in f.m. receivers.

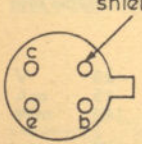


Construction: TO–72		
VCB max. (IE=0)	−20	V
ICM max.	10	mA
Ptot max. (Tamb=30°C)	60	mW
fT (VCB=−6 V; IE=1 mA) Typ.	75	MHz
*Cobs (VCB=−6 V; IE=1 mA) Typ.	2·5	pF

At frequencies below 10·7 MHz the feedback capacitance in common emitter (Coes) is approx. 3·5 pF at IE=1 mA; VCE=−6 V.
*f=100 MHz.

AF127

Germanium p-n-p alloy-diffused transistor. For use as a mixer/oscillator and i.f. amplifier in m.w. and l.w. a.m. receivers.

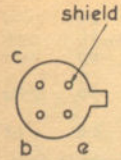


Construction: TO–72		
VCB max. (IE=0)	−20	V
ICM max.	10	mA
Ptot max. (Tamb=30°C)	60	mW
fT (VCB=−6 V; IE=1 MA) Typ.	75	MHz
*Cobs (VCB=−6 V; IE=1 mA) Typ.	2·5	pF

At frequencies below 10·7 MHz the feedback capacitance in common emitter (Coes) is approx. 3·5 pF at IE=1 mA; VCE=−6 V.
*f=100 MHz.

AF139

Germanium p-n-p mesa transistor. For use as a mixer/oscillator at frequencies up to 860 MHz.

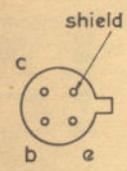


Construction: TO–72		
VCBO max.	−20	V
VCEO max.	−15	V
ICM max.	10	mA
Ptot max. (Tamb ⩽45°C)	60	mW
fT (VCE=−12 V; IC=1·5 mA) Typ.	550	MHz
*Max. unilateralised power gain, Typ.	11·5	dB
*Noise figure (Rs=60 Ω), Typ.	7	dB

*VCB=−12 V; IE=1·5 mA; f=800 MHz.

AF178

Germanium p-n-p alloy-diffused transistor. For use as a mixer/oscillator at frequencies up to 260 MHz.

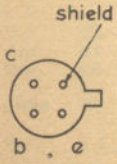


Construction: TO–12		
VCB max. (IE=0)	−25	V
ICM max.	10	mA
Ptot max. (Tamb ⩽45°C)	75	mW
fT (VCB=−12 V; IE=1 mA) Typ.	180	MHz
*Cobs (VCB=−12 V; IE=1 mA) Typ.	1·8	pF
hfe	>20	
†Noise figure, Typ.	6	dB

*f=200 MHz.
†IC=1 mA; VCE=−12 V; f=200 MHz; RS=30 Ω.

AF179

Germanium p-n-p alloy-diffused transistor. For use as a large signal i.f. amplifier in television receivers.

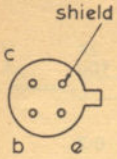


Construction: TO–12		
VCB max.	−25	V
ICM max.	15	mA
Ptot max. (Tamb=25°C)	140	mW
ICBO (VCB=−10 V; IE=0 mA) Max.	8	μA
*Coes (VCE=−14 V; IE=6·5 mA)	1·8	pF

*f=35 MHz.

AF180

Germanium p-n-p alloy-diffused transistor. For use as an r.f. amplifier in television tuners, with forward gain control for frequencies up to 220 MHz.

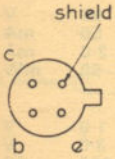


Construction: TO–12		
VCB max. (IE=0)	−25	V
ICM max.	25	mA
Ptot max. (Tamb=25°C)	156	mW
*Noise factor, Typ.	3·5	dB
ICBO (VCB=−10 V; IE=0) max.	10	μA
†Max. unilateralised gain, Typ.	25	dB

*f=200 MHz; GhS=40 mmho; BS=0.
†IE=3 mA; VCB=−10 V; f=200 MHz.

AF181

Germanium p-n-p alloy-diffused transistor. For use as a television video i.f. amplifier with forward a.g.c.

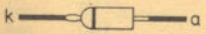


Construction: TO–12		
VCB max. (IE=0)	−30	V
ICM max.	20	mA
Ptot max. (Tamb=25°C)	156	mW
hFE (Ic=3 mA; VCE=−10 V) min.	20	
ICBO (VCB=−10 V; IE=0) Typ.	1·4	μA
*fT (VCB=−10 V; IE=3 mA) Typ.	170	MHz
†Max. unilateralised gain, Typ.	35	dB

*f=35 MHz.
†VCE=−10 V; IE=3 mA; f=35 MHz.

BA100

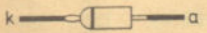
Silicon junction diode, for general purpose applications.



Construction: DO–7		
VRM max.	60	V
IFM	100	mA
IF	90	mA
Max. VF at IF of:		
100 μA	0·75	V
1 mA	1·0	V
30 mA	1·5	V
Tamb max.	+90	°C

BA102

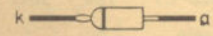
Silicon variable capacitance diode.



Construction: DO–7		
VR max.	20	V
IR max.	100	μA
Capacitance Ratio: Cd (VR=10 V) / Cd (VR=4 V) max.	0·7	
Tamb max.	90	°C

BA144

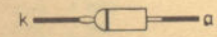
Gold bonded silicon diode intended for use in television flywheel synchronising circuits.



VRM max.	50	V
IFM max.	50	mA
IF (AV) max.	2·0	mA
Ptot max.	50	mW
Max. VF at IF of: (at Tamb=25°C):		
100 μA	1·0	V
30 mA	3·0	V
Tj max.	150	°C

BA145

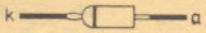
A high speed double diffused silicon diode intended for use in clamping circuits, line phase detectors and burst phase detectors of colour television receivers.



Plastic construction: DO–14		
VRWM max.	300	V
IF (AV) max.	10	mA
IFRM max.	100	mA
Max. VF at IF of (at Tj=75°C):		
100 mA	1·0	V
Tj max.	125	°C

BA148

A fast general purpose diode.

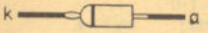


Plastic construction: DO–14		
VRRM max.	350	V
VRWM max.	300	V
IF (AV) max. Averaged over any 20 ms period	0·3	A
IFRM	2	A
VF max. at IF of 2 A	1·5	V
*IR max. at VR of 300 V	200	μA
Tj max.	125	°C

*Tj=125°C.

BA154

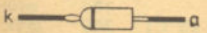
Silicon whiskerless diode for use in television circuits and general purpose applications; all-glass construction.



VR max.	50	V
IF max.	30	mA
IFRM max.	50	mA
Max. VF at IF of (at Tj=25°C):		
1·0 mA	0·9	V
30 mA	1·5	V
Tj max.	175	°C

BA155

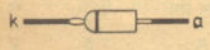
Silicon whiskerless diode for use as video noise limiter and in general purpose applications; all-glass construction.



VR max.	150	V
IF max.	100	mA
IFRM max.	150	mA
Max. VF at IF of (at Tj=25°C):		
10 mA	1·2	V
50 mA	1·5	V
Tj max.	175	°C

BA156

Silicon whiskerless diode intended for use as bias stabiliser in class B output stages; all-glass construction.



IF max.	30	mA
VF (Tj=25°C) at:		
IF=0·2 mA	500 to 590	mV
IF=3·0 mA	585 to 800	mV
Tj max.	175	°C
θj-amb (in free air)	0·6	deg C/mW

BB105

Variable capacitance silicon diode for u.h.f. tuners.

VR max.	20	V
IR max.	100	mA
Capacitance Ratio:		
Cd (VR= 3 V) (f=1·0 MHz) / Cd (VR=25 V)	min. 4	
	max. 5	
Tj max.	60	°C

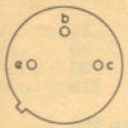
BC107

Silicon n-p-n planar epitaxial transistor. For use in audio driver stages and television signal processing circuits.

Construction: TO–18		
VCBO max.	50	V
VCEO max.	45	V
IC max.	100	mA
Ptot max. (Tamb ≤25°C)	300	mW
hfe (VCE=5V; IC=2 mA)	125 to 500	
fT (VCE=5 V; IC=10 mA)	300	MHz

BC108

Silicon n-p-n planar epitaxial transistor. Intended for applications as audio pre-amplifiers, driver stages in amplifiers, radio and television receivers.



Construction: TO–18		
VCBO max.	30	V
VCEO max.	20	V
IC max.	100	mA
Ptot max. (Tamb ≤25°C)	300	mW
hfe (VCE=5 V; IC=2 mA)	125 to 500	
fT (VCE=5 V; IC=10 mA)	300	MHz

BC109

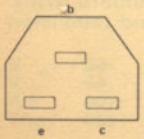
Silicon n-p-n planar epitaxial transistor. For use in low noise input stages in high quality amplifiers and tape recorders.

Construction: TO–18		
VCBO max.	30	V
VCEO max.	20	V
IC max.	100	mA
Ptot max. (Tamb ≤25°C)	300	mW
hfe (VCE=5 V; IC=2 mA)	240 to 900	
fT (VCE=5 V; IC=10 mA)	300	MHz
*Noise figure (Typ.)	2·0	dB

*IC=0·2 mA; VCE=5 V; RS=2·0 kΩ; f=30 Hz to 15 KHz.

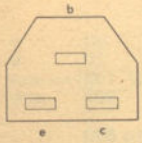
BC147

Silicon n-p-n planar epitaxial transistors in plastic encapsulation with three rigid self-locking strips suitable for insertion into printed circuit boards using standard grids. for use in audio driver stages and television signal processing circuits.



VCBO max.	50	V
VCEO max.	45	V
IC max.	100	mA
Ptot max. (Tamb ≤25°C)	220	mW
hfe (VCE=5·0 V; IC=2·0 mA)	125 to 500	
fT Typ. (VCE=5·0 V; IC=10 mA)	300	MHz

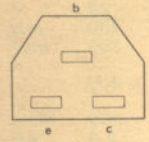
BC148



Silicon n-p-n planar epitaxial transistor in plastic encapsulation with three rigid self-locking strips suitable for insertion into printed circuit boards using standard grids. For use in audio preamplifiers, and driver stages in amplifiers, radio and television receivers.

VCBO max.	30	V
VCEO max.	20	V
IC max.	100	mA
Ptot max. (Tamb ⩽25°C)	220	mW
hfe (VCE=5 V; IC=2 mA)	125 to 500	
fT Typ. (VCE=5 V; IC=10 mA)	300	MHz

BC149

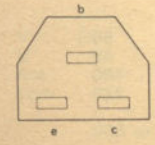


Silicon n-p-n planar epitaxial transistor in plastic encapsulation with three rigid self-locking strips suitable for insertion into printed circuit boards using standard grids. For use in low noise input stages in high quality amplifiers and tape recorders.

VCBO max.	30	V
VCEO max.	20	V
IC max.	100	mA
Ptot max. (Tamb ⩽25°C)	220	mW
hfe (VCE=5 V; IC=2 mA)	240 to 900	
fT Typ. (VCE=5 V; IC=10 mA)	300	MHz
*Noise figure (Typ.)	2·0	dB

*IC=0·2 mA; VCE=5 V; RS=2·0 kΩ; f=30 Hz to 15 kHz.

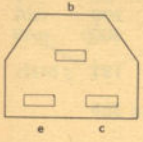
BC157



Silicon p-n-p planar epitaxial transistor in plastic encapsulation with three rigid self-locking strips suitable for insertion into printed circuit boards using standard grids. For use in audio driver stages and television signal processing circuits.

VCBO max.	50	V
VCEO max.	45	V
IC max.	100	mA
Ptot max. (Tamb ⩽25°C)	220	mW
hfe (VCE=−5 V; IC=−2 mA)	75 to 260	
fT Typ. (VCE=−5 V; IC=−10 mA)	130	MHz

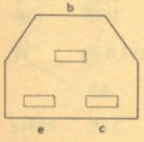
BC158



Silicon p-n-p planar epitaxial transistor in plastic encapsulation with three rigid self-locking strips suitable for insertion into printed circuit boards using standard grids. For use in audio preamplifiers, and driver stages in amplifiers, radio and television receivers.

VCBO max.	30	V
VCEO max.	25	V
IC max.	100	mA
Ptot max. (Tamb ⩽25°C)	220	mW
hfe (VCE=−5 V; IC=−2 mA)	75 to 260	
fT Typ. (VCE=−5 V; IC=−10 mA)	130	MHz

BC159

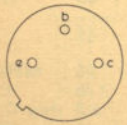


Silicon p-n-p planar epitaxial transistor in plastic encapsulation with three rigid self-locking strips suitable for insertion into printed circuit boards using standard grids. For use in low noise input stages in high quality amplifiers and tape recorders.

VCBO max.	25	V
VCEO max.	20	V
IC max.	100	mA
Ptot max. (Tamb ⩽25°C)	220	mW
hfe (VCE=−5 V; IC=−2 mA)	125 to 500	
fT Typ. (VCE=−5 V; IC=−10 mA)	130	MHz
*Noise figure (Typ.)	2·0	dB

*IC=−0·2 mA; VCE=−5 V; RS=2·0 kΩ; f=30 Hz to 15 kHz.

BC186



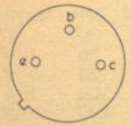
Silicon p-n-p planar epitaxial transistor. For use in television applications and driver stages of audio amplifiers.

Construction: TO–18

VCBO max.	40	V
VCEO max.	25	V
ICM max.	200	mA
Ptot max. (Tamb ⩽25°C)	300	mW
fT Typ. (VCE=−5 V; IC=−50 mA)	168	MHz
hFE (VCE=−5 V; IC=−50 mA)	35 to 175	

BC187

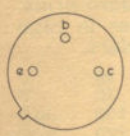
Silicon p-n-p planar epitaxial transistor. For use in television applications and driver stages of audio amplifiers.



Construction: TO–18		
VCBO max.	30	V
VCEO max.	25	V
ICM max.	200	mA
Ptot max. (Tamb=25°C)	300	mW
fT Typ. (VCE=−5 V; IC=50 mA)	191	MHz
hFE (VCE=−5 V; IC=−50 mA)	65 to 325	

BD115

Silicon n-p-n planar transistor. For use in class 'A' output stages of audio amplifiers operating from a supply voltage of 100 volts.

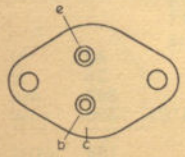


Construction: TO–39		
VCBO max.	220	V
VCEO max.	180	V
ICM max.	150	mA
*Ptot max. (Tamb ⩽50°C, mounted on a heatsink)	6·0	W
hFE Typ. (VCE=100 V; IC=50 mA)	60	
fT Typ. (VCE=100 V; IC=30 mA)	145	MHz

*Mounted on a 1·5 mm blackened aluminium heatsink, area ⩾30 cm².

BD121

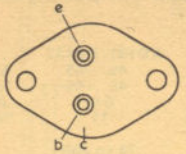
Silicon n-p-n planar epitaxial power transistor intended for general audio applications.



Construction: TO–3		
VCBO max.	60	V
ICM max.	5	A
Ptot max. (Tmb=25°C)	45	W
hFE (VCE=10 V; IC=1·0 A) Typ.	55	
fT Typ. (IC=1 A; VCE=10 V)	95	MHz
Tj max.	175	°C
θj-mb	3·3	deg C/W

BD123

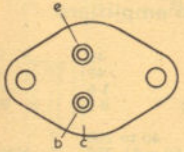
Silicon n-p-n planar epitaxial power transistor intended for general audio applications.



Construction: TO–3		
VCBO max.	90	V
ICM max.	5	A
Ptot max. (Tmb=25°C)	45	W
hFE (VCE=10 V; IC=1·0 A) Typ.	55	
fT Typ. (IC=1 A; VCE=10 V)	85	MHz
Tj max.	175	°C
θj-mb	3·3	deg C/W

BD124

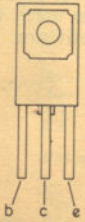
Silicon n-p-n planar epitaxial power transistor intended for television frame timebase output stages and general purpose medium power applications.



Construction: SO–55/SB2–5		
VCBO (IC ⩽1 mA)	70	V
ICM max.	4	A
Ptot max. (Tmb ⩽60°C)	15	W
hFE min. (IC=0·5 A)	35	
fT min. (IC=250 mA)	60	MHz
Tj max.	175	°C
θj-mb	7·5	deg C/W

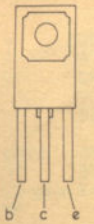
BD131

Silicon n-p-n planar epitaxial transistor for general purpose and medium power applications.



Construction: TO–126		
VCBO max.	70	V
VCEO max.	45	V
ICM max.	6·0	A
Ptot max. (Tmb ⩽60°C)	11	W
hFE min. (VCE=12 V; IC=0·5 A)	40	
fT min. (VCE=5 V; IC=0·25 A)	60	MHz
Tj max	125	°C
θj-mb	6·0	deg C/W

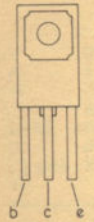
BD131
BD132



Silicon n-p-n planar epitaxial transistor (BD131) and p-n-p (BD132) output transistors.
Complementary matched pair for push-pull stages.

Construction: TO–126	BD131	BD132	
VCBO max.	45	−45	V
VCEO max.	45	−45	V
ICM max.	6·0		A
Ptot max. (Tmb ≤60°C)	11		W
hFE (VCE=±12 V; ICF=0·5 A)	78 to 250		
fT min. (VCE=±5 V; IC=0·25 A)	60		MHz
Tj max.	125		°C
θj-mb	6·0		deg C/W

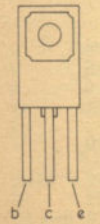
BD135



Silicon n-p-n planar epitaxial transistor in plastic encapsulation. Suitable for use in high dissipation single-ended driver circuits, or in complementary driver pairs with type BD136 in high quality audio amplifiers.

Construction: TO–126		
VCBO max.	45	V
VCEO max.	45	V
ICM max.	1·5	A
Ptot max. (Tmb ≤60°C)	6·5	W
hFE (VCE=2 V; IC=150 mA)	40 to 250	
fT Typ. (VCE=5 V; IC=50 mA)	250	MHz
Tj max.	125	°C
θj-mb	10	deg C/W

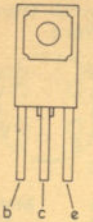
BD136



Silicon p-n-p planar epitaxial transistor in plastic encapsulation. Suitable for use in high dissipation single-ended driver circuits, or in complementary driver pairs with type BD135 in high quality audio amplifiers.

Construction: TO–126		
VCBO max.	−45	V
VCEO max.	−45	V
ICM max.	1·5	A
Ptot max. (Tmb ≤60°C)	6·5	W
hFE (VCE=−2 V; IC=150 mA)	40 to 250	
fT Typ. (VCE=−5 V; IC=50 mA)	75	MHz
Tj max	125	°C
θj-mb	10	deg C/W

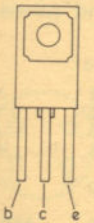
BD137



Silicon n-p-n planar epitaxial transistor in plastic encapsulation. Suitable for use in high dissipation single-ended driver circuits, or in complementary driver pairs with type BD138 in high quality audio amplifiers.

Construction: TO–126		
VCBO max.	60	V
VCEO max.	60	V
ICM max.	1·5	A
Ptot max. (Tmb≤60°C)	6·5	W
hFE (VCE=2 V; IC=150 mA)	40 to 160	
fT Typ. (VCE=5 V; IC=50 mA)	250	MHz
Tj max.	125	°C
θj-mb	10	deg C/W

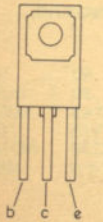
BD138



Silicon p-n-p planar epitaxial transistor in plastic encapsulation. Suitable for use in high dissipation single-ended driver circuits, or in complementary driver pairs with type BD137 in high-quality audio amplifiers.

Construction: TO–126		
VCBO max.	−60	V
VCEO max.	−60	V
ICM max.	1·5	A
Ptot max. (Tmb≤60°C)	6·5	W
hFE (VCE=−2 V; IC=150 mA)	40 to 160	
fT Typ. (VCE=−5 V; IC=50 mA)	75	MHz
Tj max.	125	°C
θj-mb	10	deg C/W

BD139

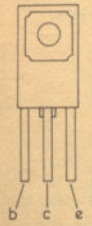


Silicon n-p-n planar epitaxial transistor in plastic encapsulation. Suitable for use in high dissipation single-ended driver circuits, or in complementary driver pairs with type BD140 in high quality audio amplifiers.

Construction: TO–126		
VCER max.	100	V
VCEO max.	80	V
ICM max.	1·5	A
Ptot max. (Tmb≤60°C)	6·5	W
hFE (VCE=2 V; IC=150 mA)	40 to 160	
fT Typ. (VCE=5 V; IC=50 mA)	250	MHz
Tj max.	125	°C
θj-mb	10	deg C/W

BD140

Silicon p-n-p planar epitaxial transistor in plastic encapsulation. Suitable for use in high dissipation single-ended driver circuits, or in complementary driver pairs with type BD139 in high quality audio amplifiers.

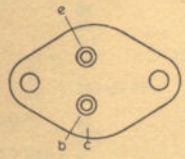


Construction: TO–126		
VCER max.	−100	V
VCEO max.	−80	V
ICM max.	1·5	A
Ptot max. (Tmb ⩽60°C)	6·5	W
hFE (VCE=−2 V; IC=150 mA)	40 to 160	
fT Typ. (VCE=−5 V; IC=50 mA)	75	MHz
Tj max.	125	°C
θj-mb	10	deg C/W

BDY20

Silicon n-p-n diffused power transistor. For use in high-quality amplifiers and power supplies.

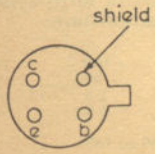
2–BDY20 Matched Pair.



Construction: TO–3		
VCBO max.	100	V
VCEO max.	60	V
ICM max.	15	A
Ptot max. (Tmb ⩽25°C)	115	W
hFE (VCE=4 V; IC=4A)	20 to 70	
fT Typ. (VCE=4 V; IC=1A)	1·0	MHz
Tj max.	200	°C
θj-mb	1·5	deg C/W

BF115

Silicon n-p-n planar epitaxial transistor intended for a.m. and f.m. applications.

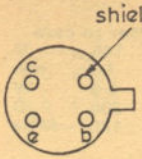


Construction: TO–72		
VCBO max.	50	V
ICM max.	30	mA
Ptot max. (Tamb ⩽45°C)	145	mW
Tj max.	175	°C
fT Typ.	230	MHz
*Noise figure	4·0	dB

*f=100 MHz; gs=10 mmho.

BF167

Silicon n-p-n planar transistor. For use in the control stage of television video i.f. amplifiers with forward gain control.

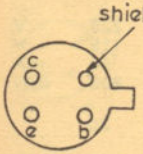


Construction: TO–72		
VCB max.	+40	V
VCE max.	+30	V
IC max.	25	mA
Ptot max. (Tamb ⩽45°C)	130	mW
fT (VCE=+10 V; IC=4 mA) Typ.	350	MHz
Max. unilateralised gain, Typ.	42	dB
*Noise figure, Typ.	3	dB

*VCE=+10 V; IC=4 mA; gs=10 mmho; f=35 MHz.

BF173

Silicon n-p-n planar epitaxial transistor. For use in the output stages of television video i.f. amplifiers.



Construction: TO–72		
VCB max.	+40	V
VCE max.	+25	V
IC max.	25	mA
Ptot max. (Tamb ⩽45°C)	200	mW
fT (VCE=+10 V; IC=5 mA)	550	MHz
Max. unilateralised gain, Typ.	42	dB

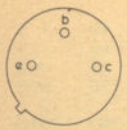
BF177

Silicon n-p-n planar transistor. For use in the video output stages of portable television receivers.

Construction: TO–5		
VCBO max.	85	V
VCEO max.	60	V
IC max.	50	mA
Ptot max. (Tamb ⩽65°C)	600	mW
hFE min. (IC=15 mA; VCE=10 V)	20	
fT Typ. (IC=10 mA; VCE=10 V)	120	MHz

BF178

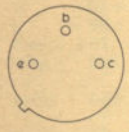
Silicon n-p-n transistor for use in video output stages.



Construction: TO–5 Collector to case		
VCBO max.	145	V
ICM max.	50	mA
Ptot max. (Tamb ≤55°C)	0·6	W
Tj max.	200	°C
fT Typ. (VCE=10 V; IC=10 mA)	120	MHz
hFE min. (VCE=20 V; IC=30 mA)	20	

BF179

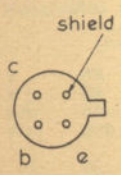
Silicon n-p-n planar transistor. For use in the video output stages of monochrome television receivers.



Construction: TO–5		
VCBO max.	225	V
VCEO max.	115	V
IC max.	50	mA
Ptot max. (Tamb ≤65°C)	600	mW
hFE min. (IC=20 mA; VCE=15 V)	20	
fT Typ. (IC=10 mA; VCE=10 V)	120	MHz

BF180

Silicon n-p-n planar transistor with forward gain control characteristics. For use in r.f. amplifier stage of television integrated tuners.

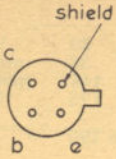


Construction: TO–72		
VCBO max.	30	V
IC max.	20	mA
Ptot max. (Tamb ≤25°C)	150	mW
*Max. unilateralised power gain	24	dB
fT (IC=2 mA; VCE=10 V) Typ.	675	MHz

*At 200 MHz.

BF181

Silicon n-p-n planar transistor with forward gain control characteristics. For use as a self-oscillating mixer or mixer in television integrated tuners.

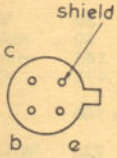


Construction: TO–72		
VCBO max.	30	V
IC max.	20	mA
Ptot max. (Tamb ≤25°C)	150	mW
*Max. unilateralised power gain	11	dB
fT Typ. (IC=2 mA; VCE=10 V)	600	MHz

*At f=900 MHz.

BF182

Silicon n-p-n planar transistor. For use as a separate mixer in television integrated tuners.

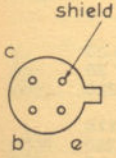


Construction: TO–72		
VCBO max.	25	V
VCEO max.	20	V
IC max.	15	mA
Ptot max. (Tamb=25°C)	150	mW
fT Typ. (IC=2 mA; VCE=10 V)	650	MHz
Noise figure (VCB=10 V; IE=2 mA; f=800 MHz) Typ.	7·4	dB
*Max. unilateralised gain Typ.	11	dB

*IE=−2 mA; VCB=10 V; f=900 MHz.

BF183

Silicon n-p-n planar transistor. For use as a local oscillator in television integrated tuners.

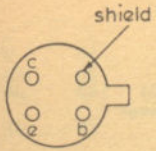


Construction: TO–72		
VCBO max.	25	V
VCEO max.	20	V
IC max.	15	mA
Ptot max. (Tamb=25°C)	150	mW
fT Typ. (IC=3 mA; VCE=10 V)	800	MHz
*Max. unilateralised gain Typ.	12·5	dB

*IE=−3 mA; VCB=10 V; f=900 MHz.

BF184

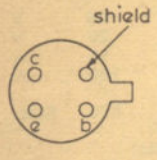
Silicon n-p-n planar epitaxial transistor recommended for use in i.f. amplifiers.



Construction: TO–72		
VCBO max.	30	V
IC max.	30	mA
Ptot max. (Tamb ⩽45°C)	145	mW
Tj max.	175	°C
hFE (IC=1 mA; VCE=10 V)	75 to 750	
fT Typ. (IC=1 mA; VCE=10 V)	300	MHz

BF185

Silicon n-p-n planar epitaxial low noise transistor. Intended for use as input and mixer/oscillator stages.

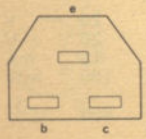


Construction: TO–72		
VCBO max.	30	V
IC max.	30	mA
Ptot max. (Tamb ⩽45°C)	145	mW
Tj max.	175	°C
hFE (IC=1 mA; VCE=10 V)	34 to 140	
fT Typ. (IC=1 mA; VCE=10 V)	220	MHz
*Noise figure Typ.	3·6	dB

*IC=1 mA; VCE=10 V; RS=100 Ω; f=100 MHz.

BF194

Silicon n-p-n epitaxial planar transistor in epoxy resin encapulation with three rigid self-locking connections. For use in a.m./f.m. receiver i.f. stages and sound i.f. stages of television receivers.

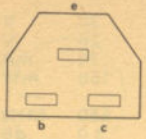


VCB max. (IE=0)	+30	V
IC max.	30	mA
Ptot max. (Tamb ⩽45°C)	220	mW
hFE (VCE=10 V; IC=1 mA) Typ.	115	
fT Typ.	260	MHz
*Noise figure Typ.	4·0	dB

*IC=1 mA; VCE=10 V; f=100 MHz; gs=10 mmho.

BF195

Silicon n-p-n epitaxial planar transistor. For use in the input and mixer stages of a.m./f.m. receivers.

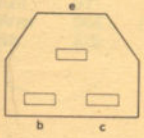


VCB max. (IE=0)	+30	V
IC max.	30	mA
Ptot max. (Tamb ⩽45°C)	220	mW
hFE (VCE=10 V; IC=1 mA) Typ.	67	
fT Typ.	200	MHz
*Noise figure Typ.	3·5	dB

*IC=1 mA; VCE=10 V; f=1 MHz; gs=20 mmho.

BF196

Silicon n-p-n planar transistor in plastic encapsulation with three rigid self-locking strips suitable for insertion into printed circuit boards using standard grids. For use in the control stage of television video i.f. amplifiers with forward gain control.

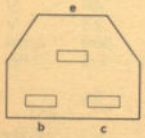


VCBO max.	40	V
VCEO max.	30	V
IC max.	25	mA
Ptot max. (Tamb=25°C)	250	mW
fT Typ. (IC=4 mA; VCE=10 V)	400	MHz
*Noise figure Typ.	3·0	dB

*IC=4 mA; VCE=10 V; gs=10 mmho; f=35 MHz.

BF197

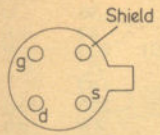
Silicon n-p-n planar epitaxial transistor in plastic encapsulation with three rigid self-locking strips suitable for insertion into printed circuit boards using standard grids. For use in the output stage of television video i.f. amplifiers.



VCBO max.	40	V
VCEO max.	25	V
IC max.	25	mA
Ptot max. (Tamb=25°C)	250	mW
fT Typ. (IC=5 mA; VCE=10 V)	550	MHz

BF200

Silicon n-p-n planar transistor with forward gain control characteristics. For use in the r.f. amplifier stage of television v.h.f. tuners.

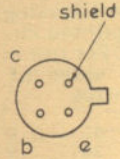


Construction: TO–72		
VCBO max.	30	V
VCEO max.	20	V
IC max.	20	mA
Ptot max. (Tamb=25°C)	150	mW
fT Typ. (IC=3 mA; VCE=10 V)	550	MHz
*Noise figure Typ.	3·0	dB

*IE=−3 mA; VCB=10 V; gs=10 mmho; f=200 MHz.

BFW10

N-channel silicon field-effect transistor, low noise, suitable for use in wide-band amplifiers.



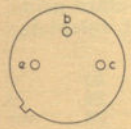
g—gate
d—drain
s—source

Construction: TO–72. Shield to case		
VDSS max.	±30	V
VGSO max.	−30	V
ID max.	20	mA
IG max.	10	mA
Ptot max. (Tamb ≤25°C)	300	mW
*N max.	2·5	dB

*f=100 MHz; RG=800 Ω; VDS=15 V; VGS=0.

BFW16A

n-p-n planar epitaxial transistor for use in driver and final stages of channel and band aerial amplifiers in bands I to V, and for final stages of wideband vertical deflection amplifiers in high speed oscilloscopes.



Construction: TO–39. Collector to case		
VCBOM max.	40	V
VCEO max.	25	V
ICM max. (f>1·0 MHz)	300	mA
Ptot max. (Tcase≤125°C)	1·5	W
hFE min (VCE=5 V; IC=150 mA)	25	
fT Typ. (VCE=15 V; IC=150 mA)	1·2	GHz
Typ. unilateralised power gain (f=800 MHz)	6·5	dB

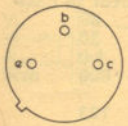
BFX29

Silicon p-n-p planar epitaxial transistor for general amplifying and switching purposes.

Construction: TO–5. Collector to case		
VCBO max.	−60	V
VCEO max.	−60	V
ICM max.	600	mA
Ptot max. (Tamb ≤25°C)	600	mW
hFE Typ. (VCE=−10V; IC=10 mA)	125	
fT min. (VCE=−10 V; IC=50 mA)	100	MHz

BFX84

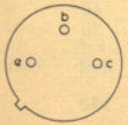
Silicon n-p-n planar epitaxial transistor.



Construction: TO–5. Collector to case		
VCBO max.	100	V
VCEO max.	60	V
ICM max.	1	A
Ptot max. (Tamb. ≤25°C)	800	mW
hFE Typ. (VCE=10 V; IC=150 mA)	112	
fT min. (VCE=10 V; IC=50 mA)	50	MHz

BFX88

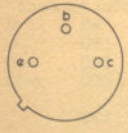
Silicon p-n-p planar epitaxial transistor for general amplifying and switching purposes.



Construction: TO–5. Collector to case		
VCBO max.	−40	V
VCEO max.	−40	V
ICM max.	600	mA
Ptot max. (Tamb ≤25°C)	600	mW
hFE Typ. (VCE=−10 V; IC=10 mA)	125	
fT min. (VCE=−10 V; IC=50 mA)	100	MHz

BFY50

Silicon n-p-n planar epitaxial transistor for general purpose applications.



Construction: TO–5. Collector to case		
VCBO max.	80	V
VCEO max.	35	V
ICM max.	1·0	A
Ptot max. (Tamb ≤ 25°C)	800	mW
hFE Typ. (VCE=10 V; IC=150 mA)	112	
fT min (VCE=10 V; IC=50 mA)	50	MHz

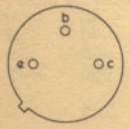
BFY51

Silicon n-p-n planar epitaxial transistor for general purpose applications.

Construction: TO–5. Collector to case		
VCBO max.	60	V
VCEO max.	30	V
ICM max.	1·0	A
Ptot max. (Tamb ≤ 25°C)	800	mW
hFE Typ. (VCE=10 V; IC=150 mA)	123	
fT min. (VCE=10 V; IC=50 mA)	50	MHz

BFY52

Silicon n-p-n planar epitaxial transistor for general purpose applications.



Construction: TO–5. Collector to case		
VCBO max.	40	V
VCEO max.	20	V
ICM max.	1·0	A
Ptot max. (Tamb ≤ 25°C)	800	mW
hFE Typ. (VCE=10 V; IC=150 mA)	142	
fT min. (VCE=10 V; IC=50 mA)	50	MHz

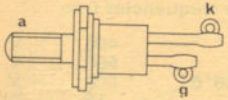
BR100

Silicon bi-directional trigger device for use in triac and thyristor trigger circuits.

Construction: DO–14		
VBO	32±4·0	V
ITRM max. (t ≤ 20 μs)	2·0	A
Pav (Tamb ≤ 70°C)	150	mW

BT101–300R
BT101–500R

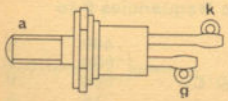
P-gate silicon reverse blocking thyristors. For use in general domestic applications.



Construction: TO–64	BT101–300R	–500R	
VRWM max.	200	400	V
VRRM max.	300	500	V
IT(AV) max.	6·5		A
IFSM max. (t=10 ms)	55		A
IGT (Tj=25°C)	>10		mA
VGT (Tj=25°C)	>2·0		V
Tj max.	125		°C

BT102–300R
BT102–500R

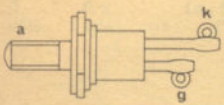
P-gate silicon reverse blocking thyristors. For use in general domestic applications.



Construction: TO–64	BT102–300R	–500R	
VRWM max.	200	400	V
VRRM max.	300	500	V
IT(AV) max.	6·5		A
IFSM max. (t=10 ms)	55		A
IGT (Tj=25°C)	>50		mA
VGT (Tj=25°C)	>2·5		V
Tj max.	125		°C

BT106

P-gate silicon reverse blocking thyristor. For use in transformerless power supplies, in particular for television applications.

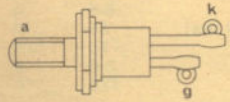


Construction: Similar to TO–64
(Ratings apply to frequencies of 0 to 400 Hz)

VRWM max.	650	V
VRRM max.	700	V
VBO min. (Tj=100°C)	500	V
IT (RMS) max.	10	A
IT (AV) max. (Tmb=90°C)	1·0	A
VGT (Tj=25°C)	>3·5	V
IGT (Tj=25°C)	>50	mA
Tj max.	100	°C

BT107

P-gate silicon reverse blocking thyristor for use in domestic and light industrial equipment.

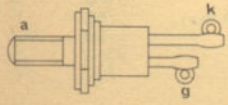


Construction: Similar to TO–64
(Ratings apply to frequencies 0 to 400 Hz)

VRWM max.	400	V
VRRM max.	500	V
VBO min. (Tj=100°C)	500	V
IT (RMS) max.	15	A
IT (AV) max. (Tmb≤60°C)	6·5	A
VGT (Tj=25°C)	>2·0	V
IGT (Tj=25°C)	>10	mA
Tj max.	100	°C

BT108

P-gate silicon reverse blocking thyristor for use in domestic and light industrial equipment.

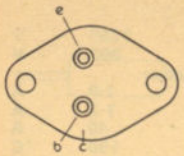


Construction: Similar to TO–64
(Ratings apply to frequencies 0 to 400 Hz)

VRWM max.	400	V
VRRM max.	500	V
VBO min (Tj=100°C)	500	V
IT (RMS) max.	15	A
IT (AV) max. (Tmb≤60°C)	6·5	A
VGT (Tj=25°C)	>3·5	V
IGT (Tj=25°C)	>50	mA
Tj max.	100	°C

BU105

Silicon n-p-n high voltage power transistor in metal envelope, intended for use in line deflection circuits of television receivers.



Construction: TO–3

VCBO max. (total peak value)	1500	V
VCER max. (total peak value, RBE≤100 Ω)	1500	V
ICM max.	2·5	A
Ptot max. (Tmb ≤90°C)	10	W
VCE (sat) max. (IC=2·5 A, IB=1·5 A)	5·0	V
Tj max.	115	°C
θj-mb	2·5	deg C/W

BY118

Silicon rectifier diode, for line deflection circuits.

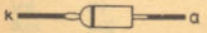
BY118

Construction: SO55/SB2–5

VRRM max.	300	V
IF (AV) max.	5	A
VF max. (Tj=25°C; IF=14 A)	1·2	V
IR max. (Tj=25°C; VRM=300 V)	100	μA
Tj max.	150	°C
θj-amb max.	5	deg C/W

BY126

Silicon double-diffused junction rectifier diode.

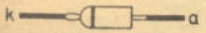


Plastic construction

VRRM	650	V
VRWM	450	V
IF (AV) for R and L load:		
at VRWM=max.	1·0	A
at VRWM=60 V	1·2	A
IFSM (t=10 ms)	40	A
Tj max.	150	°C

BY127

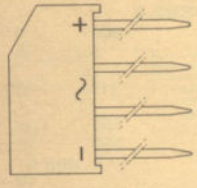
Silicon double-diffused junction rectifier diode.



Plastic construction		
VRRM	1250	V
VRWM	800	V
IF (AV) for L and R loads:		
at VRWM = max.	1·0	A
at VRWM = 60 V	1·2	A
IFSM (t = 10 ms)	40	A
Tj max.	150	°C

BY164

Silicon bridge rectifier consisting of four silicon double diffused junction diodes in a plastic encapsulation. For use in mains powered domestic equipment.

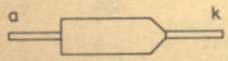


Vin (RMS) max.	42	V
VIRM	120	V
*Vout max.	60	V
†Vout max.	38	V
†Iout max. (Tamb ≤ 40°C)	1·4	A
IORM	5·0	A

*Capacitive load.
†Resistive/Inductive load.

BY176

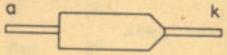
Silicon plastic encapsulated E.H.T. rectifier diode. For television applications, particularly in small-screen receivers.



VRRM max.	15	kV
VRWM max.	15	kV
IF (AV) max.	2·5	mA
IFRM max.	250	mA
Tj max.	95	°C

BY182

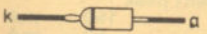
Silicon E.H.T. rectifier diode for use in trebler circuits of colour television receivers.



VRRM max.	12	kV
VRWM max.	12	kV
IF (AV) max.	2·5	mA
IFRM max.	250	mA
Tj max.	95	°C

BYX10

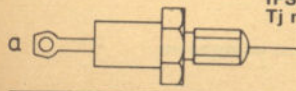
Silicon double diffused rectifier diode in plastic encapsulation, intended for use in low current rectifier applications.



VRRM max.	1600	V
VRWM max.	800	V
IF (AV) max. (R and L load):		
at VRWM max.	0·36	A
at VRWM = 60 V	0·5	A
IFRM max.	3·0	A
IFSM max. (t = 10 ms)	15	A
Tj max.	150	°C
θj-amb max.	200	deg C/W

BYX38–300

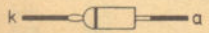
Silicon diffused junction rectifier diode for power applications.



Construction: DO–4		
VRRM	300	V
VRWM	200	V
IF (AV) max.		
(Tamb ≤ 125°C)	2·5	A
IFSM (t = 10 ms)	38	A
Tj max.	150	°C

OA90

Germanium point-contact diode. For use as a detector or f.m. demodulator in a.m. and f.m. receivers.

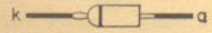


Construction: DO–7		
Max. Reverse voltage peak		
VRM	30	V
*average VR (AV)	20	V
Max. Forward current peak		
IFM	45	mA
*average IF (AV)	10	mA
surge (1 sec. max.)	200	mA
Tamb	75	°C

*Averaged over any 50ms period or d.c. component.

OA91

Germanium point-contact diode. For use as a detector in a.m. receivers, and as a general purpose diode.

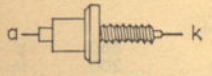


Construction: DO–7		
Max. Reverse voltage peak		
VRM	115	V
average VR (AV)	90	V
Max. Forward current peak		
IFM	150	mA
*average IF (AV)	50	mA
Tamb	25	°C

*With zero reverse voltage. Averaged over any 50ms period or d.c. component.

OA210

Silicon junction rectifier diode.

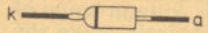


At Tamb=70°C		
Max. P.I.V.	400	V
Max. forward current peak		
(at P.I.V. max.)	5·0	A
*average	500	mA
Tamb max.	70	°C

*Averaged over any 50ms period or d.c. component.

BZY88

Voltage regulator diodes. Dissipation 400 mW (Tamb=50°C). Voltage tolerance ±5%.



Construction: DO–7

Type No.	Nom. Zener Voltage
BZY88–C3V3	3·3
–C3V6	3·6
–C3V9	3·9
–C4V3	4·3
–C4V7	4·7
–C5V1	5·1
–C5V6	5·6
–C6V2	6·2
–C6V8	6·8
–C7V5	7·5
–C8V2	8·2
–C9V1	9·1
–C10	10
–C11	11
–C12	12
–C13	13
–C15	15
–C16	16
–C18	18
–C20	20
–C22	22
–C24	24
–C27	27
–C30	30

INTEGRATED CIRCUITS

Full Data Sheets also available on request

TAA300

Monolithic integrated circuit comprising a complete a.f. amplifier; the voltage range of 4·5 to 9 V and low current drain make the circuit specially suitable for battery operation.

Construction: TO–74		
Supply voltage (nom)	9·0	V
Pout (typ.)	1·0	W
with input signal	8·5	mV
and load impedance	8·0	Ω
Total quiescent current (typ.)	8·0	mA
Operating ambient temperature range	−55 to +150	°C

TAA310

Monolithic integrated circuit comprising a complete low noise audio pre-amplifier. Suitable for use as a record and playback amplifier for tape.

Construction: TO–74		
Supply voltage (nom.)	7·0	V
Voltage gain (typ.)	100	dB
Noise figure (max.)	4·0	dB
Operating ambient temperature range	−20 to +75	°C

TAA350

Monolithic integrated circuit for amplification of f.m. i.f. signals. The high gain circuit, employing long-tailed pairs with constant current drive to the emitters, forms a wide band differential limiting amplifier with excellent a.m. rejection.

Construction: TO–74		
Supply voltage (nom.)	6·0	V
Matched power gain at 6 MHz (typ.)	80	dB
A.M. rejection with slope detector	50	dB
Total current drain (typ.)	20	mA
Operating ambient temperature range	−25 to +125	°C

TAA570

Monolithic integrated circuit comprising a four-stage limiter amplifier with symmetrical phase f.m. detector and remote d.c. volume control. Excellent a.m. rejection is obtained by a differential amplifier incorporating long-tailed pairs.

Construction: TO–74		
Supply voltage (nom.)	12·0	V
Frequency	6·0	MHz
A.M. rejection at Vin=10 mV (typ.)	45	dB
Detected audio output (typ.)		
at 15 kHz frequency deviation	0·3	V
at 50 kHz frequency deviation	1·0	V
Total current drain (typ.)	19	mA
Operating ambient temperature range	−25 to +75	°C

TAA700

Monolithic integrated circuit for signal processing in TV receivers; designed for receivers using valves or transistors in the deflection and video output stages, and n-p-n transistors in the tuner and i.f. amplifier stages.

The circuit functions comprise video pre-amplifier, line gated a.g.c. detector, noise protection circuit, sync pulse separator, line flywheel phase detector, field sync pulse separator, and blanking facility for the video amplifier.

Construction: 16-lead quad-in-line package		
Supply voltage (nom.)	12	V
Supply current		
nom., no. a.g.c.	22	mA
max. demand	43	mA
Total power dissipation (Tamb 55°C)	400	mW
Operating ambient temperature range	−25 to +125	°C

TAD100

The TAD100 is a silicon integrated circuit primarily intended for a.m. receivers. The circuit incorporates the mixer, oscillator, i.f. amplifier, a.g.c. and audio preamplifier stages. The audio output transistors are not included so that different output power stages may be added to suit individual receiver requirements. The frequency response of the circuit is such that the front half of the circuit may be used as an i.f. amplifier at 10·7 MHz for f.m. receivers.

Construction: TO–116 (14-lead dual-in-line package)			
Supply voltage (nom)	6	9	V
Performance in a typical receiver:			
Output power (AC187/AC188 output pair) Typ.	0·7	1·5	W
Total receiver quiescent current (no signal) Typ.	15	21	mA
Sensitivity (R.F. at pin 1 to obtain 10 mV from detector) Typ.	4	4	μV
Operating ambient temperature range	−10 to +55		°C

SEMICONDUCTOR COMPARABLES

INTRODUCTION

The comparables section consists of a list of suitable Mullard replacements for semiconductor devices made by other manufacturers. It has been compiled by comparing the published data for individual types. In general, Mullard types are given only if their important electrical characteristics are as good as, or better than, the type to be replaced.

For example, a Mullard AC127 is given as a replacement for a 2SD96. A comparison of the electrical ratings and characteristics which are important for replacement purposes is as follows:

	Ptot max.	VCB max.	VCER max.	IC max.	fT
2SD96	300mW	25V	18V	250mA	2·0MHz
AC127	340mW	32V	32V	500mA	2·5MHz

Thus considering the design tolerance in domestic equipment, the use of the AC127 as a replacement is justified. However, once the Mullard type has been selected from this list, its encapsulation details should be studied to determine whether the Mullard device will fit into the space available.

Semiconductor devices made by different manufacturers seldom have exactly the same nominal characteristics, and, unlike valves, it is not therefore possible to give a list of direct replacements – those types which may confidently be interchanged because all ratings, characteristics and encapsulation details are the same or very similar. The characteristics of some devices made by other manufacturers may be quoted at different d.c. conditions to those used by Mullard, and the measurement methods may also vary; circuit configurations used in various radios, etc. can also differ considerably. On rare occasions even breakdown may result when the Mullard replace-

ment is fitted. In general, however, good results can be obtained by using the following hints.

Replacement hints

The following points are intended as a guide to some of the problems which may be encountered in radio and audio equipment.

1. Polarity

It is essential that the correct polarity transistor (n-p-n or p-n-p) is used. The collector terminal of p-n-p transistors will be negative with respect to the emitter, and the collector terminal of n-p-n transistors will be positive with respect to the emitter.

2. Lead lengths

The leads of all replacement components should be the same length as those of the original devices. If there is a screen lead on the Mullard replacement it should be connected to chassis if possible.

3. Audio-frequency stages in portables

Arrangements with either output and driver transformers, or a driver transformer only, normally use p-n-p transistors, but if one n-p-n is present every transistor in the arrangement is probably n-p-n. Complementary push-pull arrangements (recognised by the absence of any transformers) usually have at least one n-p-n transistor and frequently more. These can be difficult to service, and it is usually necessary to trace out the circuit if no diagram is available.

4. A.F. driver transistor

The replacement should be selected with care in circuits where the battery voltage is greater than 12V. The

collector voltage rating should be twice the battery voltage, when a driver transformer is used.

5. A.F. output transistors

If an output transistor has failed, and the cause appears to be over-heating, the Mullard replacement may also be in danger of failing. If there is room, cooling clips should be fitted to the output transistors, or the area of the heat-sink should be enlarged if one already exists. Otherwise the value of the emitter resistor can be increased, or thermistors can be fitted across the base bias resistors.

6. Car radio output stages

Arrangements with no driver transformer may use a number of circuit configurations, and the pre-amplifier and driver transistors can be p-n-p or n-p-n. A Mullard AD149 should be used as a p-n-p output transistor replacement in all car radio circuits.

7. A.M. I.F. stages

When transistors in i.f. stages are replaced, a type should be chosen which has a similar value of feedback capacitance. Unfortunately these figures for other manufacturers' types have not always been available. In general, an OC45 is a suitable p-n-p type when neutralising components are used, and an AF117 (also p-n-p) should be used when there is no neutralisation. If there is instability after the replacement has been fitted satisfactory operation may be obtained by making some circuit modifications. For example, if there are neutralising components the value of the neutralising capacitor should be altered. If there is no neutralisation, and if the transformer is single-tuned and of the correct phasing, instability may be removed by inserting a neutralising capacitor (value 1 to 10pF). Another method of making the stage stable is to insert a damping resistor across the primary of the i.f. transformer in the collector circuit.

8. A.M. oscillator and mixer stages

An AF117 is a suitable p-n-p replacement. If the circuit does not oscillate after the replacement has been fitted, the emitter current should be increased (but not over 3mA). If there is squegging the value of the emitter decoupling capacitor should be reduced, and if this is unsuccessful a damping resistor should be connected across the oscillator tuned circuit.

9. F.M. I.F. stages

A Mullard AF116 (p-n-p) should be used. If instability occurs the value of the neutralising capacitor should be altered if one is present. Otherwise the emitter current should be reduced (but not to less than half its value) by increasing the value of the upper base bias resistor. A damping resistor connected across the i.f. coil in the collector circuit may cure instability if other methods have failed.

10. F.M. oscillators and mixers

Mullard AF114, AF178 (both p-n-p) should be used. It is important to ensure that the lead lengths of the replacements are the same as those of the original devices. Instability can sometimes be cured by adjusting the value of the emitter current (by altering the value of the upper base bias resistor). It may be necessary to alter the value of the emitter feedback capacitor in oscillators.

11. F.M. R.F. amplifiers

A Mullard AF114 or AF178 (both p-n-p) should be used as a replacement. If there is instability the emitter current should be reduced by increasing the value of the upper base bias resistor across the coil in the collector tuned circuit.

SEMICONDUCTOR COMPARABLES

Type No.	Mullard Comparable
A2E5	BY126
A2E9	BY126
A2K4	BY127
A2K5	BY127
A2K9	BY127
A7D	BY126
A344	BC108, BC109
A345	BC108, BC109
A346	BC108, BC109
AA112	OA90
AA116	OA90
AA118	OA91
AA119	AA119
AA120	AA129
AA129	AA129
AA130	OA90
AA131	AA119
AA132	OA91
AC106	AC128
AC107	AC107
AC110	AC126
AC114	AC128
AC117	AC128
AC120	AC128
AC121	AC128
AC122	AC126
AC123	AC126
AC124	AC126
AC125	AC126
AC126	AC126
AC127	AC127
AC127Z	AC127Z
AC128	AC128
AC131	AC128
AC132	AC128
AC134	AC126
AC138	AC128
AC139	AD149
AC141	AC176
AC150	AC128
AC151	AC126
AC152	AC128
AC153	AC128
AC153K	AC128
AC154	AC128
AC155	AC128
AC15	AC128
AC157	AC127
AC160	AC127
AC162	AC126
AC163	AC126
AC166	AC128
AC167	AC128
AC168	AC127
AC169	AC128
AC170	AC126
AC171	AC126
AC172	AC127
AC175	AC127
AC176	AC176
AC177	AC128
AC181	AC127
AC185	AC127
AC187	AC187
AC188	AC188
AD139	AD149
AD149	AD149
AD150	AD149
AD152	AD149
AD155	AD162
AD156	AD162
AD157	AD162
AD161	AD161
AD162	AD162
AF102	AF179
AF105	AF116
AF109	AF178
AF110	AF181
AF113	AF178
AF114	AF114
AF115	AF115
AF116	AF116
AF117	AF117
AF118	AF118
AF121	AF181
AF124	AF124
AF125	AF125
AF126	AF126
AF127	AF127
AF129	AF178

Type No.	Mullard Comparable
AF130	AF178
AF134	AF178
AF139	AF139
AF142	AF181
AF143	AF181
AF144	AF181
AF164	AF181
AF165	AF181
AF166	AF181
AF178	AF178
AF179	AF179
AF180	AF180
AF181	AF181
AF182	AF180
AF186	AF139
AF200	AF181
AF201	AF181
AFY12	AF178
AFY19	BFX88
AFZ11	AF178, AF180
AFZ12	AF178, AF180
AG150	BA155
B2E5	BY126
B2E9	BY126
B2K5	BY127
B2K9	BY127
B1022	AC128
BA100	BA100
BA102	BA102
BA114	BA156
BA115	BA155
BA116	BA130
BA144	BA144
BA145	BA145
BA148	BA148
BA154	BA154
BA155	BA155
BA156	BA156
BB105	BB105
BC107	BC107
BC108	BC108
BC109	BC109
BC113	BC108
BC114	BC109
BC115	BC107
BC118	BC107
BC119	BFY51
BC125	BC107
BC134	BC107
BC142	BFX84
BC145	BF178
BC147	BC147
BC148	BC148
BC149	BC149
BC150	BC109
BC151	BC107
BC157	BC157
BC158	BC158
BC159	BC159
BC167	BC107
BC168	BC109
BC169	BC109
BC170	BC109
BC170A	BC108
BC170B	BC108
BC170C	BC108
BC171	BC107
BC172	BC109
BC186	BC186
BC187	BC187
BCY42	BC107
BCY59	BC107
BD115	BD115
BD116	BD123
BD121	BD121
BD123	BD123
BD124	BD124
BD131	BD131
BD135	BD135
BD136	BD136
BD137	BD137
BD138	BD138
BD139	BD139
BD140	BD140
BDY20	BDY20
BF109	BF178
BF115	BF115
BF154	BC108
BF167	BF167
BF173	BF173

Type No.	Mullard Comparable
BF177	BF177
BF178	BF178
BF179	BF179
BF180	BF180
BF181	BF181
BF182	BF182
BF183	BF183
BF184	BF184
BF185	BF185
BF194	BF194
BF195	BF195
BF196	BF196
BF197	BF197
BF200	BF200
BF216	BF115
BFW10	BFW10
BFW16A	BFW16A
BFX29	BFX29
BFX84	BFX84
BFX88	BFX88
BFY18	BC107
BFY19	BC107
BFY39	BC107
BFY50	BFY50
BFY51	BFY51
BFY52	BFY52
BR100	BR100
BSY20	BC108, BC109
BSY26	BC108, BC109
BSY27	BC108, BC109
BSY72	BC107, BF184
BSY95A	BC108, BC109
BT101	BT101
BT102	BT102
BT106	BT106
BT107	BT107
BT108	BT108
BU105	BU105
BY100	BY127
BY100S	BY127
BY101	BY126
BY105	BY127
BY114	BY126
BY118	BY118
BY122	BY164
BY124	BY126
BY125	BY126
BY126	BY126
BY127	BY127
BY130	BY126
BY140	BY182
BY164	BY164
BY176	BY176
BY182	BY182
BYX10	BYX10
BYX38–300	BYX38–300
BYY34	BY126
BYZ13	BYX38–300
CA2DO2	AD149
CER72	BY127
CER72D	BY127
CER700C	BY126
CER720	BY127
CG60H	OA90
CG61H	OA90
CG62H	OA90
CG63H	OA90
CG64H	OA90
CK721	AC126
CK722	AC126
CK724	AC126
CK725	AC126
CK727	AC126
CK751	AC128
CK870	AC126
CK871	AC126
CK872	AC128
CK878	AC128
CK882	AC128
CK888	AC128
COD1538	BY127
COD1618	BY127
CSD2310	BA155
CSD2317	BA155
CST1773	AD149
CST1773A	AD149
CTP1004	AD149
CTP1005	AD149
CTP1032	AC126
CTP1033	AC126

Type No.	Mullard Comparable
CTP1034	AC126
CTP1035	AC126
CTP1036	AC126
CTP1104	AD149
CTP1108	AD149
CTP1109	AD149
CTP1320	AC126
CTP1330	AC126
CTP1340	AC126
CTP1350	AC126
CTP1360	AC126
CTP1514	AD149
D45C	BY126
D58C	BY127
D105C	BY127
D148S	BY127
D158S	BY127
D165	BY127
DD006	BY126
DD056	BY126
DD058	BY127
DD268	BY127
DR365	AA119
DR400	BY126
DR800	BY127
DS26	AC128
DS34	AF178
DS41	AF178
DS44	AC127
DS46	AC126
DS501	AD149
EA080	BY127
ED3	AA119
ED1800	AA119
ED1892	OA90
ED1903	OA91
ED2102	OA90
ED2848	BY127
ED2911	BY127
ED2919	BY126
ED2923	BY127
ER41	BY126
ER81	BY127
ER308	BY127
ERD800	BY127

Type No.	Mullard Comparable
F8	BY127
FD212	BA155
FD213	BA155
FD227	BA155
FD260	BA155
FSP270–1	BF167
FST1/4	BY127
FST2/8	BY127
G5/5	AA119
G5/103	AA119
G5/104	AA119
G5/105	AA119
G1050	BY127
GA52829	AC126
GD1E	AA119
GD2E	OA91
GD3	OA90
GD4	OA90
GD4E	AA119
GD4S	AA119
GD5	AA119
GD5E	AA119
GD6E	AA119
GD11	OA90
GD12	OA90
GD13E	AA119
GD71E	AA119
GD72E/3	AA119
GD72E/4	AA119
GD73E/3	AA119
GD73E/4	AA119
GD73E/5	AA119
GET3	AC126
GET4	AC126
GET102	AC126
GET103	AC128
GET104	AC128
GET106	AC126, AC128
GET113	AC128
GET114	AC128
GET116	AC128
GET119	AC128
GEX12	OA90
GEX23	OA91
GEX34	AA119

Type No.	Mullard Comparable
GEX36	OA90
GEX37	OA90
GEX39	OA90
GEX45	OA91
GEX54	OA91
GFT20	AC126
GFT21	AC126
GFT25	AC126
GFT32	AC126
GFT41	AF178
GFT42A	AF178
GFT2006/30	AD149
GFT3008/20	AD149
GFT3008/40	AD149
GFT3408/20	AD149
GFT3408/40	AD149
GFT4012/30	AD149
GFT8024	AD149
GSD5/4	AA119
GT3	AC126
GT4A	AC128
GT14	AC128
GT20	AC128
GT31	AC126
GT32	AC128
GT33	AC128
GT34	AC126
GT38	AC126
GT74	AC126
GT81	AC126, AC128
GT81HS	AC126
GT81R	AC128
GT83	AC126
GT87	AC126
GT109	AC128
GT109R	AC128
GT122	AC126
GT222	AC126
GT310	AC128
GT2766	AC127
GT2906	AC127
H2	AD149
H3	AD149
H4	AD149
HA1	AC126

Type No.	Mullard Comparable
HA2	AC126
HA3	AC126
HC1	AC126
HD197	AC128
HJ15	AC126
HJ17	AC128
HJ17D	AC128
HJ34	AC128
HJ34A	AC128
HJ50	AC126
HJ51	AC128
HJ74	AF117
HT400	BC108, BC109
HT401	BC108, BC109
IWP	BY127
JCN4	BY126
JP1	AC128
K5/2	OA90
KGS1000	AC128
M8HZ	BY127
M82	BY127
M720B	BY127
MA215	BY126
ME1001	BC107
ME1002	BC107
ME2001	BC107
ME2002	BC107
ME4101	BC107
ME4102	BC107
MM4	BY126
MT84	BY127
MT101	AC176
NKT72	AF124/5/6/7
NKT128	AC128
NKT131	AF180
NKT132	AF180
NKT133	AF180
NKT141	AF180
NKT142	AF180
NKT143	AF180
NKT144	AF180
NKT202	AC126
NKT203	AC128
NKT204	AC126
NKT205	AC126

Type No.	Mullard Comparable
NKT206	AC126
NKT208	AC128
NKT211	AC128
NKT212	AC128
NKT213	AC128
NKT214	AC128
NKT215	AC128
NKT216	AC128
NKT218	AC128
NKT222	AC128
NKT223	AC128
NKT224	AC128
NKT225	AC128
NKT231	AC128
NKT232	AC128
NKT251	AC128
NKT251A	AC128
NKT252	AC128
NKT253	AC128
NKT261	AC128
NKT262	AC128
NKT263	AC128
NKT264	AC128
NKT270	AC128
NKT271	AC128
NKT272	AC128
NKT273	AC128
NKT274	AC128
NKT275	AC128
NKT275A	AC128
NKT275E	AC128
NKT275J	AC128
NKT278	AC128
NKT304	AD149
NKT415	AD149
NKT451	AD149
NKT452	AD149
NKT453	AD149
NKT676	AF178
NKT713	AC127
NKT773	AC176
OA59	OA90
OA60	OA90
OA70	OA90
OA72	AA119

Type No.	Mullard Comparable
OA73	OA90
OA79	AA119
OA81	OA91
OA90	OA90
OA91	OA91
OA150	OA91
OA160	OA90
OA179	AA119
OA210	OA210
OA211	BY127
OA214	BY127
OA257	OA90
OA258	OA90
OC13	AC126
OC16	AD149
OC25	AD149
OC30	AD162
OC34	AC126
OC38	AC126
OC71N	AC126
OC79	AC128
OC80	AC128
OC81	AC128
OC81D	AC128
OC81DM	AC128
OC81M	AC128
OC82	AC128
OC85	AC128
OC169	AF126, AF127
OC302	AC126
OC601	AC126
OC602	AC126
OC604	AC126
OC615	AF178
OC615V	AF178
OC702B	AC127
OC810	AC126
OC811	AC126
OC6015	AF178
OD603	AD149
OD603/50	AD149
OD604	AD149
OD605	AD149
OS33	BA100
OX3003	AC126

Type No.	Mullard Comparable
OX3004	AC128
OY100	BY127
OY101	BY127
P6RP8	BY127
PA340A	BY126
PA380	BY127
PADT24	AF178
PADT25	AF178
PSO25	BY126
PS140	BY126
PS724	BA155
PS2247	BY126
Q6	AC128
Q7	AC128
Q8	AC128
RL31	AA119
RL32	AA119
RL52	AA119
RL246	AA119
RL252	AA119
S16	BY126
S16A	BY126
S16B	BY126
S235	BY126
S243	BY126
SD38	OA91
SD92	BY126
SD94	BY126
SEO5A	BY126
SFD107	OA90
SFD108	OA91
SFD112	AA119
SFT124	AC128
SFT125	AC128
SFT125P	AC128
SFT130	AC128
SFT162	AF118
SFT316	AF180, AF181
SFT317	AF179, AF180
SFT319	AF179, AF180
SFT320	AF179, AF180
SFT325	AC128
SFT354	AF180, AF181
SFT357	AF180, AF181
SFT357P	AF181

Type No.	Mullard Comparable
SFT358	AF180
SG217	BA155
SH1	BY126
SLA604	BY126
SLA604A	BY126
SM105SS	BY126
SR500	BY126
SR500B	BY126
SWO5A	BY126
SX633	BY127
SX635	BY127
SX644	BY126
UT227	BY126
V10/15	AC126
V10/30	AC126
V10/50	AC126
V30/20P	AD149
V30/30P	AD149
V208	AD149
V308	AD149
VD11	OA90
VD12	OA90
VD13	OA90
WR400	BY126
XA131	AF178
XA141	AF178
XA142	AF178
XA143	AF178
XA161	AF178
XB102	AC126
XB104	AC126
XB112	AC126
XB113	AC126
XC101	AC128
XC131	AC128
XC171	AC128
XU604	BY127
Y363	AC126
Y633	AC128
ZDT	BC108, BC109
ZJ13	AC128
ZR12	BY118
ZS12	AC128
ZS15	AC128
ZS34	AC128

Type No.	Mullard Comparable
ZS38	AC128
ZS56	AC128
ZS91	AC128
ZT40	BC108, BC109
ZT41	BC108, BC109
ZT80	AC127

Numerical

1G91	OA90
1G92	OA90
1G95	AA119
1HY100	BY127
1L5TI	AC128
1N28A	OA91
1N34	OA90
1N34A	OA90
1N36	AA119
1N38	OA90
1N38A	OA91
1N38B	OA91
1N39A	OA90
1N42	OA91
1N48	OA91
1N52	OA91
1N56A	OA90
1N57A	OA90
1N60	AA119
1N60A	AA119
1N64	OA90, AA119
1N64A	AA119
1N70	OA91
1N70A	OA91
1N74	OA91
1N81	AA119
1N87	OA90
1N87A	OA90
1N88	OA91
1N90	OA91
1N96	OA90
1N97	OA91
1N97A	OA91
1N98	OA91
1N99	OA91
1N99A	OA91
1N100	OA91
1N105	AA119
1N127A	OA91
1N128	AA119
1N128A	AA119
1N142	OA91
1N254	BY126
1N255	BY126
1N256	BY127
1N267	AA119
1N290	AA119
1N295A	OA90
1N310	OA91
1N313	OA91
1N332	BY126
1N338	BY127
1N341	BY126
1N342	BY126
1N343	BY126
1N344	BY126
1N345	BY126
1N346	BY126
1N348	BY126
1N349	BY126
1N441	BY126
1N442	BY126
1N443	BY126
1N444	BY127
1N445	BY127
1N448	OA91
1N462	BA155
1N476	OA91
1N478	OA91
1N479	OA91
1N486A/B	BY126
1N487	BY126
1N488A/B	BY126
1N538	BY126
1N540	BY126
1N541	AA119
1N542	2–AA119
1N547	BY127
1N560	BY127
1N562	BY127

Type No.	Mullard Comparable
1N599A	BY126
1N600A	BY126
1N602/A	BY126
1N603/A	BY126
1N604/A	BY126
1N605/A	BY126
1N606/A	BY126
1N616	OA90
1N617	OA91
1N618	OA91
1N646	BY126
1N673	BY126
1N781	AA119
1N781A	AA119
1N801	BA155
1N801M	BA155
1N802	BA155
1N802M	BA155
1N854	BY127
1N1095	BY127
1N1096	BY127
1N1103	BY127
1N1169	BY127
1N1255	BY126
1N1255A	BY126
1N1259	BY127
1N1486	BY127
1N1492	BY127
1N1693	BY126
1N1695	BY126
1N2071/A	BY127
1N2505	BY127
1N2611	BY126
1N2613	BY127
1N2615	BY127
1N2616	BY127
1N2773	BY127
1N3182	BA102
1N3193	BY127
1N3194	BY127
1N3195	BY127
1N3196	BY127
1N3221	BY127
1N3242	BY127
1N3547	BY126
1N3625	BA155
1N3769	OA91
1N4005	BY127
1N4250	BY127
1NU40	AC126
1NU70	AC126
1P541	AA119
1P542	AA119
1S038	BY127
1S054	BY127
1S058	BY127
1S32	OA90
1S33	OA90
1S34	OA90
1S47	BY127
1S83	BY126
1S84	BY126
1S90	BY126
1S91	BY126
1S92	BY126
1S93	BY126
1S94	BY127
1S95	BY127
1S96	BY127
1S97	BY127
1S107	BY127
1S117	BY127
1S119	BY127
1S124	BY126
1S127	OA90
1S149	BY126
1S206	BY126
1S209	BY126
1S426	OA90
1S557	BY127
1S686	BY126
1S1692	BY127
1S1693	BY127
1S1694	BY127
1S1695	BY127
1T23	OA90
1T508	BY127
2G101	AF180, AF181
2G102	AF117
2G108	AC126

Type No.	Mullard Comparable
2G109	AC126
2G201	AC128
2G202	AC128
2G270	AC128
2G271	AC128
2G319	AC126
2G320	AC128
2G381	AC128
2G382	AC128
2G401	AF117
2G402	AF117
2G416	AF117
2G417	AF117
2N34	AC128
2N34A	AC126, AC128
2N35	AC127
2N36	AC126, AC128
2N37	AC126, AC128
2N38	AC126, AC128
2N38A	AC126, AC128
2N44	AC128
2N48	AC126
2N54	AC126, AC128
2N59A	AC128
2N59B/C	AC128
2N60	AC128
2N61	AC128
2N62	AC128
2N87	AC128
2N102	AD161
2N108	AC128
2N109	AC128
2N117	AC176
2N118	AC176
2N119	AC176
2N138A	AC128
2N138B	AC128
2N156	AD149
2N170	AC127
2N175	AC107
2N180	AC128
2N181	AC128
2N185	AC128
2N186	AC128
2N186A	AC128

Type No.	Mullard Comparable
2N187	AC128
2N187A	AC128
2N188	AC128
2N188A	AC128
2N191	AC128
2N192	AC128
2N195	AC128
2N196	AC128
2N199	AC128
2N213	AC176
2N214	AC127
2N217	AC128
2N218	AF117
2N219	AF117
2N220	AC107
2N224	AC128
2N225	AC128
2N226	AC128
2N227	AC128
2N228	AC127
2N229	AC127
2N230	AD149
2N234	AD149
2N234A	AD149
2N235	AD149
2N236	AD149
2N238	AC128
2N241	AC128
2N241A	AC128
2N249	AC128
2N252	AF117
2N257	AD149
2N257A	AD149
2N257G	AD149
2N257W	AD149
2N265	AC128
2N266	AC128
2N270	AC128
2N272	AC128
2N285A	AD149
2N285B	AD149
2N290	AF178
2N291	AC128
2N300	AF178
2N301	AD149

Type No.	Mullard Comparable
2N301A	AD149
2N302	AC128
2N303	AC128
2N306	AC127
2N306A	AC127
2N308	AF117
2N309	AF117
2N310	AF117
2N322	AC128
2N323	AC128
2N324	AC128
2N325	AD149
2N331	AC128
2N344	AC107
2N350	AD149
2N350A	AD149
2N351	AD149
2N351A	AD149
2N352	AD149
2N353	AD149
2N358	AC127
2N358A	AC127
2N362	AC128
2N364	AC127
2N365	AC127
2N366	AC127
2N376	AD149
2N385	AC127
2N388	AC127
2N399	AD149
2N407	AC128
2N408	AC128
2N409	AF117
2N410	AF117
2N419	AD149
2N431	AC176
2N432	AC176
2N433	AC176
2N439A	AC127
2N447	AC127
2N447A	AC127
2N460	AC128
2N461	AC128
2N464	AC128
2N465	AC128

Type No.	Mullard Comparable
2N466	AC128
2N467	AC128
2N484	AF180
2N486	AF179, AF180
2N507	AC127
2N519	AC128
2N563	AC128
2N564	AC128
2N565	AC128
2N566	AC128
2N567	AC128
2N568	AC128
2N569	AC128
2N570	AC128
2N571	AC128
2N572	AC128
2N576	AC127
2N609	AC128
2N610	AC128
2N611	AC128
2N612	AC128
2N613	AC128
2N624	AF181
2N631	AC128
2N632	AC128
2N633	AC128
2N634	AC127
2N634A	AC127
2N647	AC127
2N649	AC127
2N655	AC128
2N702	BC107
2N703	BC107
2N728	BC107
2N728	BC107
2N990	AF178
2N991	AF124/5/6/7
2N992	AF126
2N993	AF127
2N1008	AC128
2N1010	AC127
2N1038	AD149
2N1059	AC127
2N1097	AC128
2N1098	AC128

Type No.	Mullard Comparable
2N1101	AC127
2N1102	AC127
2N1128	AC128
2N1141	AF178
2N1142	AC126
2N1143	AF117
2N1144	AC128
2N1145	AC128
2N1173	AC127
2N1176	AC128
2N1177	AF181
2N1178	AF181
2N1179	AF181
2N1195	AF118
2N1251	AC127
2N1264	AF117
2N1274	AC128
2N1287	AC128
2N1287A	AC128
2N1353	AC128
2N1370	AC128
2N1372	AC128
2N1386	BC108, BC109
2N1406	AF178
2N1407	AF178
2N1431	AC127
2N1515	AF180
2N1516	AF180
2N1517	AF180
2N1524	AF180
2N1525	AF180
2N1586	AC176
2N1587	AC176
2N1589	AC176
2N1590	AC176
2N1592	AC176
2N1593	AC176
2N1624	AC127
2N1631	AF181
2N1632	AF181
2N1636	AF181
2N1637	AF181
2N1638	AF181
2N1639	AF181
2N2061	AD149
2N2061A	AD149
2N2062	AD149
2N2063	AD149
2N2064	AD149
2N2067	AD149
2N2067B	AD149
2N2067G	AD149
2N2067–0	AD149
2N2067W	AD149
2N2089	AF114, AF181
2N2090	AF115
2N2091	AF116
2N2092	AF117
2N2207	AF118
2N2256	BC108, BC109
2N2257	BC108, BC109
2N2271	AC128
2N2429	AC126
2N2430	AC127
2N2431	AC128
2N2495	AF178
2N2496	AC107, AF180
2N2512	AF118
2N2626	BC107
2N2654	AF179
2N2671	AF181
2N2672	AF181
2N2672A	AF181
2N2706	AC128
2N2712	BC107
2N2715	BF173
2N2716	BF173
2N2835	AD149
2N2836	AD149
2N2921	BC107
2N2922	BC107
2N2923	BC107
2N2924	BC107
2N2925	BC107
2N2926	BC107
2N2953	AC128
2N3074	AF180
2N3075	AF181
2N3153	AC126
2N3287	BC107

Type No.	Mullard Comparable
2N3288	BC107
2N3289	BC107
2N3290	BC107
2N3291	BC107
2N3292	BC107
2N3293	BC107
2N3294	BC107
2N3391	BC107
2N3391A	BC107
2N3392	BC107
2N3393	BC107
2N3394	BC107
2N3443	AC126
2N3493	BF173
2N3565	BC107
2N3588	AF181
2N3662	BF173
2N3663	BF173
2N3691	BC107
2N3692	BC107
2N3693	BC107
2N3694	BC107
2N3707	BC107
2N3708	BC107
2N3709	BC107
2N3710	BC107
2N3825	BC107
2N4026	BD138
2N4077	AD161
2N4078	AD162
2N4079	AD161/AD162
2N4286	BC107
2N4433	BF115
2N4434	BF184
2N4435	BF185
2S37	AC128
2S38	AC128
2S39	AC128
2S40	AC128
2S41	AD149
2S41A	AD149
2S43	AC128
2S44	AC128
2S54	AC128
2S56	AC128
2S144	AF117
2S163	AC128
2S179	AC128
2S433	AF124/5/6/7
2SA24	AF178
2SA25	AF178
2SA37	AF117
2SA38	AF117
2SA39	AF117
2SA41	AF117
2SA42	AF117
2SA51	AF117
2SA58	AF124/5/6/7
2SA59	AF117
2SA60	AF124/5/6/7
2SA69	AF180
2SA70	AF180
2SA71	AF180
2SA72	AF114/5/6/7
2SA73	AF114/5/6/7
2SA75	AF180
2SA76	AF114/5/6/7
2SA77	AF178
2SA82	AF124, AF125
2SA92	AF124/5/6/7
2SA93	AF124/5/6/7
2SA103	AF117
2SA105	AF178
2SA116	AF178
2SA117	AF178
2SA118	AF178
2SA124	AF178
2SA125	AF178
2SA130	AF181
2SA131	AF181
2SA134	AF178
2SA135	AF178
2SA144	OC170, OC171
2SA148	AF115
2SA153	AF178
2SA155	AF117
2SA159	AF178
2SA161	AF178
2SA175	AF114/5/6
2SA213	AF178

Type No.	Mullard Comparable	Type No.	Mullard Comparable
2SA216	AF178	2SA427	AF180
2SA220	AF114/5/6	2SA428	AF180
2SA221	AF114/5/6	2SA432	AF178
2SA222	AF114/5/6	2SA433	AF114/5/6
2SA223	AF114/5/6	2SB19	AD162
2SA227	AF178	2SB20	AD162
2SA229	AF178	2SB26	AD149
2SA230	AF178	2SB27	AD149
2SA234	AF178	2SB28	AD149
2SA235	AF178	2SB29	AD149
2SA236	AF114/5/6	2SB30	AD149
2SA237	AF114/5/6	2SB31	AD149
2SA240	AF178	2SB32	AC126
2SA242	AF178	2SB33	AC128
2SA250	AF118	2SB34	AC128
2SA255	AF114/5/6	2SB37	AC128
2SA256	AF124/5/6/7	2SB38	AC128
2SA257	AF124/5/6/7	2SB39	AC107
2SA258	AF124/5/6/7	2SB44	AC128
2SA259	AF124/5/6/7	2SB46	AC126
2SA285	AF114/5/6	2SB48	AC126
2SA286	AF114/5/6	2SB49	AC126
2SA287	AF114/5/6	2SB50	AC126
2SA288	AF178	2SB51	AC128
2SA289	AF178	2SB52	AC128
2SA290	AF178	2SB53	AC128
2SA313	AF114/5/6	2SB54	AC128
2SA314	AF114/5/6	2SB55	AC128
2SA315	AF124/5/6/7	2SB56	AC128
2SA316	AF124/5/6/7	2SB57	AC128
2SA323	AF114/5/6	2SB58	AC128
2SA324	AF114/5/6	2SB59	AC126
2SA340	AF124/5/6/7	2SB60	AC126
2SA341	AF124/5/6/7	2SB60A	AC126
2SA342	AF124/5/6/7	2SB61	AC126
2SA343	AF178	2SB63	AD162
2SA345	AF178	2SB66	AC126
2SA346	AF178	2SB70	AC126
2SA347	AF178	2SB71	AC126
2SA348	AF178	2SB73	AC107
2SA349	AF178	2SB74	AC126
2SA359	AC126, AF118	2SB75	AC126
2SA361	AF178	2SB76	AC126
2SA377	AF179	2SB77	AC128
2SA403	AF178	2SB78	AC128

Type No.	Mullard Comparable	Type No.	Mullard Comparable
2SB79	AC128	2SB145	AD149
2SB80	AD149	2SB146	AD149
2SB83	AD149	2SB154	AC128
2SB89	AC128	2SB155	AC128
2SB90	AC126	2SB156	AC128
2SB91	AC128	2SB157	AC128
2SB92	AC128	2SB158	AC128
2SB94	AC128	2SB159	AC128
2SB95	AC128	2SB160	AC126
2SB96	AC128	2SB161	AC128
2SB97	AC107	2SB162	AC128
2SB98	AC128	2SB163	AC128
2SB99	AC128	2SB164	AC128
2SB100	AC126	2SB165	AC128
2SB101	AC128	2SB166	AC128
2SB102	AC128	2SB167	AC128
2SB103	AC128	2SB168	AC126
2SB104	AC128	2SB169	AC128
2SB105	AD149	2SB170	AC128
2SB106	AD149	2SB171	AC128
2SB107	AD149	2SB172	AC128
2SB108	AD149	2SB173	AC126
2SB109	AD149	2SB174	AC128
2SB110	AC126	2SB175	AC128
2SB111	AC126	2SB176	AC128
2SB112	AC126	2SB177	AC128
2SB113	AC126	2SB178	AC128
2SB114	AC128	2SB179	AC128
2SB115	AC128	2SB180	AD149
2SB116	AC128	2SB183	AC126
2SB117	AC128	2SB184	AC128
2SB118	AD149	2SB185	AC126
2SB119	AD149	2SB186	AC126
2SB120	AD149	2SB187	AC126
2SB126	AD149	2SB188	AC128
2SB127	AD149	2SB189	AC128
2SB131	AD149	2SB190	AC128
2SB134	AC126	2SB192	AC128
2SB135	AC126 AC128	2SB193	AC128
2SB136	AC128	2SB194	AC128
2SB137	AD149	2SB195	AC128
2SB140	AD149	2SB196	AC128
2SB142	AD149	2SB197	AC128
2SB143	AD149	2SB198	AC128
2SB144	AD149	2SB199	AC128

Type No.	Mullard Comparable
2SB200	AC128
2SB201	AC128
2SB202	AC128
2SB219	AC128
2SB220	AC128
2SB221	AC128
2SB222	AC128
2SB223	AC128
2SB254	AC128
2SB255	AC128
2SB261	AC128
2SB262	AC128
2SB263	AC128
2SB264	AC126
2SB293	AC128
2SB294	AC128
2SB345	AC126
2SB346	AC126
2SB347	AC126
2SB348	AC126
2SB415	AC128
2SB448	AD149
2SB475	AC128
2SC37	BC107
2SC39A	BC107
2SC80	BC107
2SC91	AC127
2SC98	BC108, BC109
2SC99	BC108, BC109
2SC103A	BC107
2SC121	BF173
2SC122	BF173
2SC123	BF173
2SC124	BF173
2SC127	BC108, BC109
2SC155	BF167
2SC156	BF167
2SC171	BC107
2SC174	BC107
2SC183	BF115
2SC184	BF115
2SC185	BF115
2SC186	BF167
2SC187	BF167
2SC206	BC107
2SC271	BF173
2SC281	BC107
2SC286	BF173
2SC287	BF173
2SC288	BF173
2SC316	BC107
2SC360	BC107
2SC368	BC107
2SC372	BC107
2SC379	BC107
2SC429	BF167
2SC430	BF167, BF173
2SD30	AC127
2SD34	AC127
2SD37	AC127
2SD38	AC127
2SD61	AC127
2SD62	AC127
2SD63	AC127
2SD64	AC127
2SD65	AC127
2SD66	AC127
2SD75	AC127
2SD77	AC127
2SD96	AC127
2SD127	AC127
2SD142	BD124
2SD178	AC127
2SD186	AC127
2SD187	AC127
2SD193	AC127
2T11	AC128
2T13	AC128
2T14	AC128
2T15	AC128
2T16	AC128
2T20	AC128
2T21	AC128
2T22	AC128
2T23	AC128
2T24	AC128
2T25	AC128
2T26	AC128
2T51	AC127
3N34	BF167

Type No.	Mullard Comparable
3N35	BF167
3N35A	BF167
3N56	AC176
3N57	AC176
3N71	BF167
3N72	BF167
3N73	BF167
3N87	BC107
3N88	BC107
4D24	BF167
4D25	BF167
4D26	BF167
33DP1	OA91
40AS	BY126
50D5	BY126
50E4	BY126
147T1	AD149
154T1	AF178
155T1	AF178
156T1	AF178
157T1	AF178
520T1	AC128
521T1	AC128
40022	AD149
40254	AD149

Mullard Comparable Types for Thorn–A.E.I. 'Lincoln' range devices which are no longer available.

Type	Mullard Comparable
AA120	AA129
AC128	AC128
AC154	AC128
AC155	AC128
AC156	AC128
AC157	AC127
AC166	AC128
AC167	AC128
AC168	AC127
AC169	AC128
AC176	AC176
AC177	AC128
AD149	AD149
AD161	AD161
AD162	AD162
BA116	BA154
BC150	BC109
BC151	BC107
BF216	BF115
BY100	BY127

Type	Mullard Comparable
BY101	BY126
BY105	BY127
BY114	BY126
BY124	BY126
BY125	BY126
BY130	BY126
2N2923	BC107
2N2924	BC107
2N2925	BC107
2N2926	BC107
2N3391	BC107
2N3391A	BC107
2N3392	BC107
2N3393	BC107
2N3394	BC107

RECEIVING VALVE TYPE NOMENCLATURE SYSTEM

All new Mullard valves are registered internationally with Pro-Electron and have type numbers according to the following code, based on the Pro-Electron type nomenclature system for receiving and amplifying valves.

The type number consists of two or more letters followed by a group of three figures (two figures in earlier types).

The first letter indicates the heater or filament voltage or current:

D	0·5 to 1·5V filament
E	6·3V heater
G	5·0V heater
P	300mA heater
U	100mA heater

Letters A (4·0V), C (200mA) and K (2·0V) have also been used.

The second and subsequent letters indicate the general class of valve:

A	single diode
B	double diode
C	triode
D	power output triode
E	tetrode
F	pentode
L	power output tetrode or pentode
H	hexode or heptode (hexode type)
K	octode or heptode (octode type)
M	tuning indicator
Y	half-wave rectifier
Z	full-wave rectifier

Two or three of these letters may be combined together, e.g. BC – double-diode triode.

The first figure of the serial number indicates the type of base:

2	B10B (10-pin) base (previously used for B8G base)
3	Octal base
4	B8A base
5	B9D (magnoval) base (previously used for miscellaneous bases)
8	B9A (noval) base
9	B7G base

The remaining figure or figures make up the serial number indicating a particular design or development.

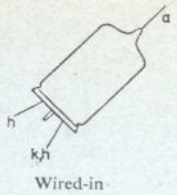
Examples	
PCF806	Triode pentode with B9A base for use in 300mA series heater chain
EC90	Triode with B7G base and 6·3V heater.

LIST OF EARLIER TYPES AND TYPES NOT IN COMMON USE

EC86	EL86	PL82	UCC85
EC88	ELL80	U25/KY50	UL41
ECC88	EY88	U301/CY30	6CB6
ECF82	PABC80	UABC80	30C15/ PCF800
EF83	PCF82	UBC81	
EF91	PCF84	UBF80	
EL81	PL81A	UBF89	

DY51

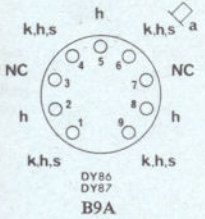
HIGH VOLTAGE HALF-WAVE RECTIFIER



Vh	1·4	V
Ih	550	mA
Pulsed input		
P.I.V. max.	15	kV
Iout	350	μA
ik(pk) max.	40	mA
C max.	2000	pF

DY86/87

E.H.T. HALF-WAVE RECTIFIER

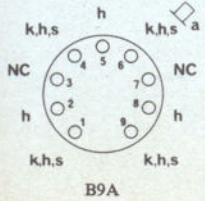


Vh	1·4	V
Ih	550	mA
Pulsed input		
P.I.V. max.	22	kV
ia(pk) max.	40	mA
Iout max.	500	μA
C max.	2000	pF

Pins 3 and 7 may only be connected to points in the heater circuit and must not be earthed.

DY802

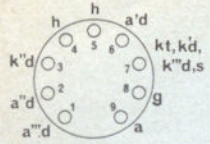
E.H.T. HALF-WAVE RECTIFIER



Vh	1·4	V
Ih	550	mA
Pulsed input		
P.I.V. max.	25	kV
ia(pk) max.	50	mA
Iout max.	500	μA
C max.	2000	pF

Pins 3 and 7 may only be connected to points in the heater circuit and must not be earthed.

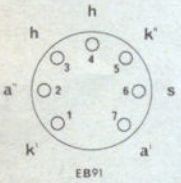
EABC80 — TRIPLE DIODE TRIODE



B9A

Vh	6·3		V
Ih	450		mA
Va	100	250	V
Vg	−1·0	−3·0	V
Ia	0·8	1·0	mA
gm	1·45	1·4	mA/V
μ	70	70	

EB91 — DOUBLE DIODE (separate cathodes)

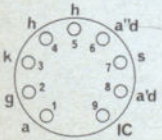


B7G

Vh	6·3	V
Ih	300	mA
*P.I.V. max.	420	V
*Ia max.	9·0	mA
*ia(pk) max.	54	mA
*vh–k(pk) max.	330	V

*Each section

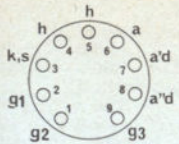
EBC81 — DOUBLE DIODE TRIODE



B9A

Vh	6·3	V
Ih	230	mA
Va	250	V
Vg	−3·0	V
Ia	1·0	mA
gm	1·2	mA/V
μ	70	

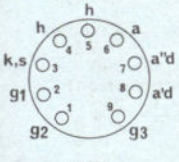
EBF80 — DOUBLE DIODE PENTODE



B9A

Vh	6·3	V
Ih	300	mA
Va = Vb	250	V
Rg2	95	kΩ
Vg2	85	V
Vg3	0	V
Rk	300	Ω
Ia	5·0	mA
Ig2	1·75	mA
gm	2·2	mA/V
μg1–g2	18	

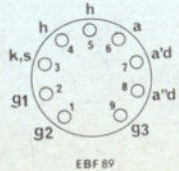
EBF83 — DOUBLE DIODE PENTODE FOR USE IN HYBRID CAR RADIOS



B9A

Vh	6·3		V
Ih	300		mA
Va	6·3	12·6	25 V
Vg3	0	0	0 V
Vg2	6·3	12·6	25 V
Rg1	2·2	2·2	2·2 MΩ
Ia	0·12	0·45	1·7 mA
Ig2	0·04	0·14	0·5 mA
gm	0·45	1·0	2·1 mA/V
ra	0·65	1·0	0·2 MΩ

EBF89 — DOUBLE DIODE VARIABLE-MU R.F. PENTODE

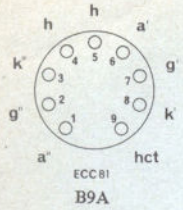


B9A

Vh	6·3		V
Ih	300		mA
Va	250	250	V
Vg3	0	0	V
Vg2	80	100	V
Vg1	−1·0	−2·0	V
Ia	9·0	9·0	mA
Ig2	2·7	2·7	mA
gm	4·5	3·8	mA/V
ra	0·9	1·0	MΩ
μg1–g2	20	20	

ECC81

R.F. DOUBLE TRIODE (separate cathodes)

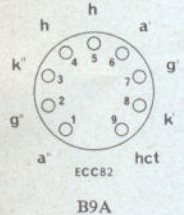


B9A

	Series	Parallel	
Vh	12·6	6·3	V
Ih	150	300	mA
Characteristics (each section)			
Va	200	250	V
Vg	−1·0	−2·0	V
Ia	11·5	10	mA
gm	6·7	5·5	mA/V
μ	70	60	

ECC82

DOUBLE TRIODE (separate cathodes)

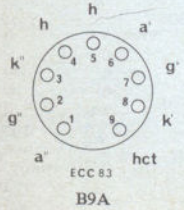


B9A

	Series	Parallel	
Vh	12·6	6·3	V
Ih	150	300	mA
Characteristics (each section)			
Va	100	250	V
Vg	0	−8·5	V
Ia	11·8	10·5	mA
gm	3·1	2·2	mA/V
μ	19·5	17	

ECC83

DOUBLE TRIODE (separate cathodes)

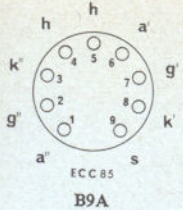


B9A

	Series	Parallel	
Vh	12·6	6·3	V
Ih	150	300	mA
Characteristics (each section)			
Va	100	250	V
Vg	−1·0	−2·0	V
Ia	0·5	1·2	mA
gm	1·25	1·6	mA/V
μ	100	100	

ECC85

R.F. DOUBLE TRIODE (separate cathodes)

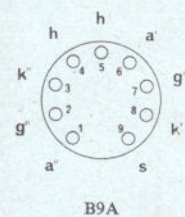


B9A

Vh	6·3	V
Ih	435	mA
Characteristics (each section)		
Va	250	V
Vg	−2·3	V
Ia	10	mA
gm	5·9	mA/V
μ	57	

ECC189

V.H.F. VARIABLE-MU FRAME-GRID CASCODE DOUBLE TRIODE

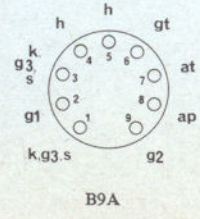


B9A

Vh	6·3	V
Ih	365	mA
Characteristics (each section)		
Va	90	V
Vg	−1·4	V
Ia	15	mA
gm	12·5	mA/V
ra	2·5	kΩ
μ	34	
Vg (for 20:1 reduction in gm)	−5·0	V
Vg (for 100:1 reduction in gm)	−9·0	V

ECF86

TRIODE FRAME-GRID PENTODE

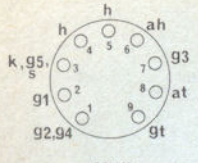


B9A

Vh	6·3		V
Ih	390		mA
	Triode	Pentode	
Va	100	170	V
Vg2	—	150	V
Vg1	−3	−1·2	V
Ia	14	10	mA
Ig2	—	3·3	mA
gm	5·7	12	mA/V
ra	3·0	>350	kΩ

ECH81

TRIODE HEPTODE FREQUENCY CHANGER

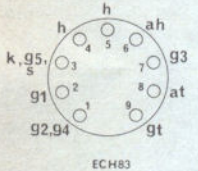


B9A

Vh	6·3	V
Ih	300	mA
Vah = Vb	250	V
Rg2+g4	22	kΩ
Rg3+gt	47	kΩ
Rk	140	Ω
Iah	3·25	mA
Ig2+g4	6·7	mA
Ig3+gt	200	μA
gc	775	μA/V
Vat	100	V
Iat	4·5	mA

ECH83

TRIODE HEPTODE FOR USE IN HYBRID CAR RADIOS

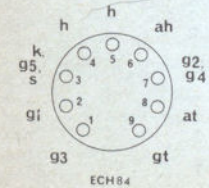


B9A

Vh	6·3	V
Ih	300	mA
Vah = Vb	12·6	V
Vg2+g4	12·6	V
Vg1	0	V
Iah	100	μA
Ig2+g4	350	μA
Ig3+gt	32	μA
Vosc(r.m.s.)	1·2	V
gc	160	μA/V
ra	3·8	MΩ
Vat = Vb	12·6	V
Iat	750	μA

ECH84

TRIODE HEPTODE FOR NOISE CANCELLED SYNC. SEPARATOR

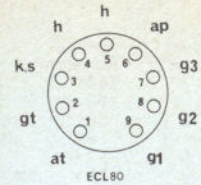


B9A

Vh	6·3		V
Ih	300		mA
	Triode	Heptode	
Va	50	135	V
Vg3	—	0	V
Vg2+g4	—	14	V
Vg1	0	0	V
Ia	3·0	1·7	mA
Ig2+g4	—	900	μA
gm	3·7	2·2	mA/V
μ	50	—	
Vg3(Ia = 20μA)	—	−2·0	V
Vg1(Ia = 20μA)	—	−1·9	V
Ia(Va = 200V, Vg = −11V)	<100	—	μA

ECL80

TRIODE OUTPUT PENTODE (pa max. = 3·5W)

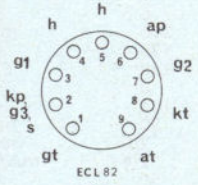


B9A

Vh	6·3		V
Ih	300		mA
	Triode	Pentode	
Va	100	200	V
Vg2	—	200	V
Vg3	—	0	V
Vg1	−2·3	−8·0	V
Ia	4·0	17·5	mA
Ig2	—	3·3	mA
gm	1·4	3·3	mA/V
μ	17·5	—	
Ra	—	11	kΩ
Pout	—	1·4	W

ECL82

TRIODE OUTPUT PENTODE (pa max. = 5·4W)

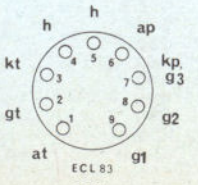


B9A

Vh	6·3		V
Ih	780		mA
	Triode	Pentode	
Va	100	250	V
Vg2	—	250	V
Ia	3·5	28	mA
Ig2	—	5·7	mA
Vg1	0	−22·5	V
gm	2·5	5·0	mA/V
Ra	—	9·0	kΩ
Pout	—	3·4	W

ECL83

TRIODE OUTPUT PENTODE (pa max. = 5·4W)

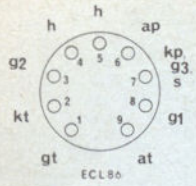


B9A

Vh	6·3		V
Ih	600		mA
	Triode	Pentode	
Va	200	200	V
Vg2	—	200	V
Ia	2·4	27	mA
Ig2	—	4·4	mA
Vg1	−1·5	−13	V
gm	2·5	5·0	mA/V
ra	34	65	kΩ
Ra	—	7·5	kΩ
Pout	—	2·5	W

ECL86

TRIODE OUTPUT PENTODE (pa max.=9W)

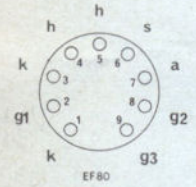


B9A

Vh	6·3		V
Ih	700		mA
	Triode	Pentode	
Va	250	250	V
Vg2	—	250	V
Ia	1·2	36	mA
Ig2	—	6·0	mA
Vg1	−1·9	−7·0	V
gm	1·6	10	mA/V
ra	62	48	kΩ
Ra	—	7·0	kΩ
Pout	—	4·0	W

EF80

HIGH SLOPE R.F. PENTODE

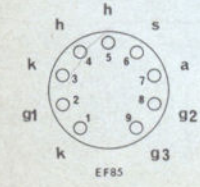


B9A

Vh	6·3	V
Ih	300	mA
Va	170	V
Vg2	170	V
Vg3	0	V
Rk	160	Ω
Ia	10	mA
Ig2	2·5	mA
gm	7·4	mA/V
μg1–g2	50	

EF85

VARIABLE-MU R.F. PENTODE

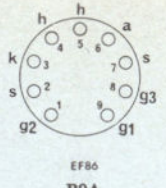


B9A

Vh	6·3	V
Ih	300	mA
Vb=Va	250	V
Rg2	60	kΩ
Vg2	100	V
Rk	160	Ω
Ia	10	mA
Ig2	2·5	mA
gm	6·0	mA/V

EF86

LOW NOISE A.F. VOLTAGE AMPLIFYING PENTODE

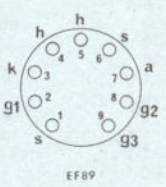


B9A

Vh	6·3	V
Ih	200	mA
Va	250	V
Vg3	0	V
Vg2	140	V
Vg1	−2·0	V
Ia	3·0	mA
Ig2	600	μA
gm	2·0	mA/V
μg1–g2	38	

EF89

VARIABLE-MU R.F. PENTODE

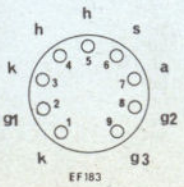


B9A

Vh	6·3	V
Ih	200	mA
Va	250	V
Vg3	0	V
Vg2	100	V
Rk	160	Ω
Ia	9·0	mA
Ig2	3·0	mA
gm	3·6	mA/V

EF183

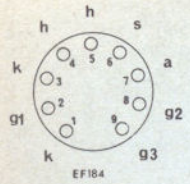
FRAME-GRID VARIABLE-MU R.F. PENTODE



B9A

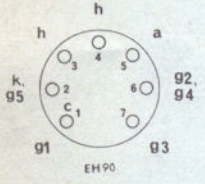
Vh	6·3	V
Ih	300	mA
Va	200	V
Vg2	90	V
Vg3	0	V
Ia	12	mA
Ig2	4·5	mA
Vg1	−2·0	V
gm	12·5	mA/V
ra	500	kΩ

EF184 — FRAME-GRID R.F. PENTODE



Vh	6·3		V
Ih	300		mA
Va	170	200	V
Vg3	0	0	V
Vg2	170	200	V
Vg1	−2·0	−2·5	V
Ia	10	10	mA
Ig2	4·1	4·1	mA
gm	15·6	15	mA/V
ra	330	380	kΩ
μg1–g2	60	60	

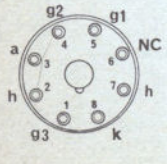
EH90 — DUAL CONTROL HEPTODE



B7G

Vh	6·3	V
Ih	300	mA
Va	100	V
Vg2+g4	30	V
Vg1	−1·0	V
Vg3	0	V
Ia	0·75	mA
Ig2+g4	1·1	mA
gm(g1–a)	1·2	mA/V
ra	900	kΩ

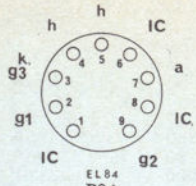
EL34 — OUTPUT PENTODE (pa max.=25W)



Octal

Vh	6·3	V
Ih	1·5	A
Va	250	V
Vg2	250	V
Vg3	0	V
Rk	106	Ω
Ia	100	mA
Ig2	15	mA
gm	11	mA/V
Ra	2·0	kΩ
Pout	11	W

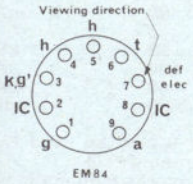
EL84 — OUTPUT PENTODE (pa max.=12W)



B9A

Vh	6·3	V
Ih	760	mA
Va	250	V
Vg2	250	V
Rk	135	Ω
Ia	48	mA
Ig2	5·5	mA
gm	11·3	mA/V
Ra	4·5	kΩ
Pout	5·7	W

EM84 — VOLTAGE INDICATOR

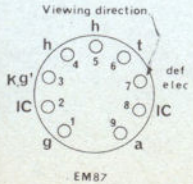


B9A

Vh	6·3		V
Ih	210		mA
Vb	250		V
Vt	250		V
Ra	470		kΩ
Rg–k	3		MΩ
Vg	0	−22	V
Ia	450	60	μA
It	1·0	1·8	mA
*L	21	0	mm

Deflection electrode connected to anode.
*Length of column

EM87 — VOLTAGE INDICATOR



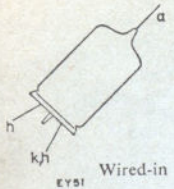
B9A

Vh	6·3			V
Ih	300			mA
Vb	250			V
Vt	250			V
Ra	100			kΩ
Rg–k	3·0			MΩ
Vg	0	−10	−15	V
Ia	2·0	0·5	0·2	mA
It	1·0	1·8	2·0	mA
*L	21	0	−1·5	mm

Deflection electrode connected to anode
*Length of column. A negative value of L indicates overlapping

EY51

HIGH VOLTAGE HALF-WAVE RECTIFIER

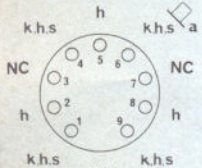


EY51 Wired-in

Vh	6·3	V
Ih	90	mA
Pulsed input		
P.I.V. max.	17	kV
Iout	350	μA
ik(pk) max.	80	mA
C max.	5000	pF

EY86/87

HIGH VOLTAGE HALF-WAVE RECTIFIER



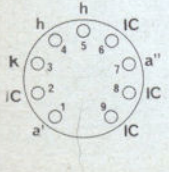
B9A

Vh	6·3	V
Ih	90	mA
Pulsed input		
P.I.V. max.	22	kV
Iout	800	μA
ia(pk) max.	40	mA
C max.	2000	pF

†Pins 1, 4, 6 and 9 may be used for fitting an anti-corona shield
*Pins 3 and 7 may only be connected to points in the heater circuit and must not be earthed

EZ80

FULL-WAVE RECTIFIER

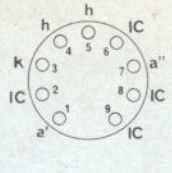


B9A

Vh	6·3	V
Ih	600	mA
Vin (r.m.s.)	2×350	V
Iout max.	90	mA
C max.	50	μF
Rlim min. (per anode)	300	Ω

EZ81

FULL-WAVE RECTIFIER

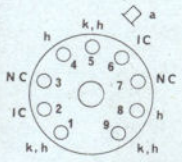


B9A

Vh	6·3	V
Ih	1·0	A
Vin (r.m.s.)	2×350	V
Iout max.	160	mA
C max.	50	μF
Rlim min. (per anode)	230	Ω

GY501

E.H.T. HALF-WAVE RECTIFIER FOR COLOUR TV



B9D

Vh	3·15	V
Ih	400	mA
P.I.V. max.	31	kV
Vout	25	kV
Iout	1·5	mA

Pins 3 and 7 may only be connected to points with the same potential as the heater, and must not be earthed

GZ34

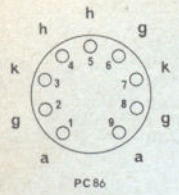
FULL-WAVE RECTIFIER

Octal

Vh	5·0	V
Ih	1·9	A
Vin(r.m.s.)	2×450	V
Iout max.	250	mA
C max.	60	μF
Rlim min. (per anode)	150	Ω

PC86

U.H.F. FRAME-GRID MIXER/ OSCILLATOR TRIODE

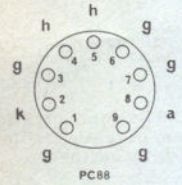


B9A

Ih	300	mA
Vh	3·8	V
Va	175	V
Vg	−1·5	V
Ia	12	mA
gm	14	mA/V
ra	4·85	kΩ
μ	68	

PC88

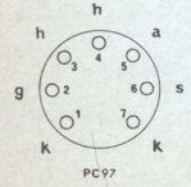
U.H.F. FRAME-GRID GROUNDED GRID AMPLIFIER TRIODE



Ih	300	mA
Vh	3·8	V
Va	160	V
Vg1	−1·25	V
Ia	12·5	mA
gm	13·5	mA/V
ra	4·8	kΩ
μ	65	

PC97

R.F. TRIODE

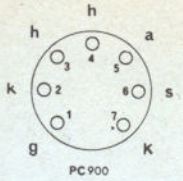


B9D

Ih	300	mA
Vh	4·5	V
Va	135	V
Vg	−1·0	V
Ia	11	mA
gm	13	mA/V
μ	65	
ra	5·0	kΩ

PC900

R.F. TRIODE

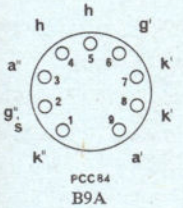


B7G

Ih	300	mA
Vh	4·0	V
Va	135	V
Vg	−1·0	V
Ia	11·5	mA
gm	14·5	mA/V
μ	72	
ra	5·0	kΩ

PCC84

DOUBLE TRIODE (separate cathodes)

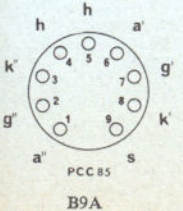


B9A

Ih	300	mA
Vh	7·0	V
Characteristics (each section)		
Va	90	V
Vg	−1·5	V
Ia	12	mA
gm	6·0	mA/V
μ	24	

PCC85

DOUBLE TRIODE (separate cathodes)

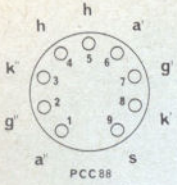


B9A

Ih	300		mA
Vh	9·0		V
Characteristics (each section)			
Va	170	200	V
Vg	−1·5	−2·1	V
Ia	10	10	mA
gm	6·2	5·8	mA/V
μ	50	48	

PCC88

FRAME-GRID DOUBLE TRIODE

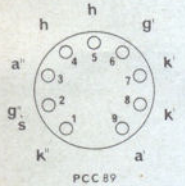


B9A

Ih	300	mA
Vh	7·0	V
Characteristics (each section)		
Va	90	V
Vg	−1·3	V
Ia	15	mA
gm	12·5	mA/V
μ	33	

PCC89

VARIABLE-MU FRAME-GRID DOUBLE TRIODE

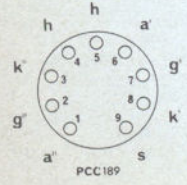


B9A

Ih	300	mA
Vh	7·5	V
Characteristics (each section)		
Va	90	V
Ia	15	mA
Vg	−1·2	V
gm	12·3	mA/V
μ	36	

PCC189

V.H.F. VARIABLE-MU FRAME-GRID CASCODE DOUBLE TRIODE

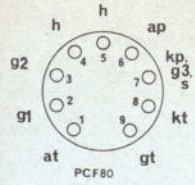


B9A

Ih	300	mA
Vh	7·6	V
Characteristics (each section)		
Va	90	V
Vg	−1·4	V
Ia	15	mA
gm	12·5	mA/V
ra	2·5	kΩ
μ	34	
Vg (for 20:1 reduction in gm)	−5·0	V
Vg (for 100:1 reduction in gm)	−9·0	V

PCF80

TRIODE PENTODE (separate cathodes)

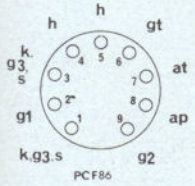


B9A

Ih	300		mA
Vh	9·0		V
	Triode	Pentode	
Va	100	170	V
Vg2	—	170	V
Vg1	−2·0	−2·0	V
Ia	14	10	mA
Ig2	—	2·8	mA
gm	5·0	6·2	mA/V
μ	20	—	

PCF86

TRIODE FRAME-GRID PENTODE

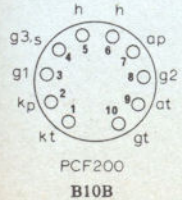


B9A

Ih	300		mA
Vh	8·0		V
	Triode	Pentode	
Va	100	170	V
Vg2	—	150	V
Vg1	−3	−1·2	V
Ia	14	10	mA
Ig2	—	3·3	mA
gm	5·7	12	mA/V
ra	3·0	>350	kΩ

PCF200

TRIODE PENTODE

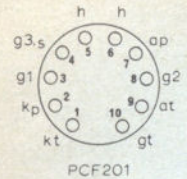


B10B

Ih	300		mA
Vh	8·0		V
	Triode	Pentode	
Va	170	160	V
Vg2	—	135	V
Vg1	−1·0	−1·7	V
Ia	8·5	13	mA
Ig2	—	5·3	mA
gm	5·2	14	mA/V
μ	57	—	

PCF201

TRIODE PENTODE

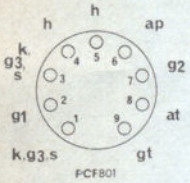


B10B

Ih	300		mA
Vh	8·0		V
	Triode	Pentode	
Va	100	160	V
Vg2	—	110	V
Vg1	−2	−1·4	V
Ia	14	13	mA
Ig2	—	5·3	mA
gm	4·8	12·6	mA/V
μ	17·5	—	

PCF801

TRIODE FRAME-GRID VARIABLE-MU PENTODE

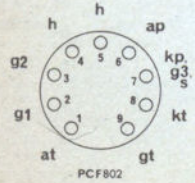


B9A

Ih	300		mA
Vh	8·5		V
	Triode	Pentode	
Va	100	170	V
Vg2	—	120	V
Vg1	−3·0	−1·4	V
Ia	15	10	mA
Ig2	—	3·0	mA
gm	9·0	11	mA/V
μ	20	—	
ra	2·2	⩾350	kΩ

PCF802

TRIODE PENTODE

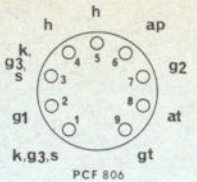


B9A

Ih	300		mA
Vh	9·0		V
	Triode	Pentode	
Va	200	100	V
Vg2	—	100	V
Vg1	−2·0	−1·0	V
Ia	3·5	6·0	mA
Ig2	—	1·7	mA
gm	3·5	5·5	mA/V
μ	70	—	
ra	20	400	kΩ

PCF806

TRIODE FRAME-GRID PENTODE

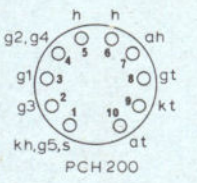


B9A

Ih	300		mA
Vh	8·0		V
	Triode	Pentode	
Va	100	170	V
Vg2	—	150	V
Vg1	−3·0	−1·2	V
Ia	14	10	mA
Ig2	—	3·3	mA
gm	5·5	12	mA/V
μ	17	—	

PCH200

TRIODE HEPTODE FOR NOISE CANCELLED SYNC SEPARATOR

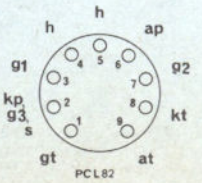


B10B

Ih	300		mA
Vh	8·5		V
	Triode	Heptode	
Va	100	14	V
Vg2+g4	—	14	V
Vg3	—	0	V
Vg1	−1·0	0	V
Ia	9	1·5	mA
Ig2+g4	—	1·3	mA
Ig3	—	1·0	μA
gm	8·8	—	mA/V
μ	50	—	

PCL82

TRIODE OUTPUT PENTODE (pa max.=7W)

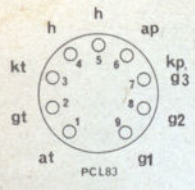


B9A

Ih	300		mA
Vh	16		V
	Triode	Pentode	
Va	100	170	V
Vg2	—	170	V
Vg1	0	−11·5	V
Ia	3·5	41	mA
Ig2	—	9·0	mA
gm	2·2	7·5	mA/V
μ	70	—	
Ra	—	3·9	kΩ
Pout	—	3·3	W

PCL83

TRIODE OUTPUT PENTODE
(pa max. = 5·4W)

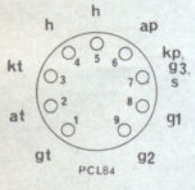


B9A

Ih	300		mA
Vh	12·6		V
	Triode	Pentode	
Va	250	170	V
Vg2	—	170	V
Vg1	−8·5	−9·5	V
Ia	10·5	30	mA
Ig2	—	5·0	mA
gm	2·2	5·5	mA/V
μ	17	—	
Ra	—	5·5	kΩ
Pout	—	2·2	W

PCL84

TRIODE OUTPUT PENTODE
(pa max. = 4W)

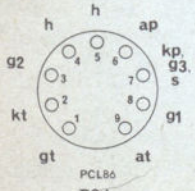


B9A

Ih	300		mA
Vh	15		V
	Triode	Pentode	
Va	200	200	V
Vg2	—	200	V
Vg1	−1·7	−2·9	V
Ia	3·0	18	mA
Ig2	—	3·0	mA
gm	4·0	10·4	mA/V
ra	16·2	130	kΩ
μg1−g2	—	36	

PCL86

TRIODE OUTPUT PENTODE
(pa max. (pentode) = 9W)

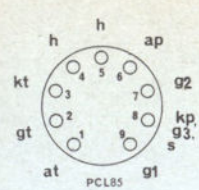


B9A

Ih	300		mA
Vh	13·3		V
	Triode	Pentode	
Va	230	230	V
Vg2	—	230	V
Vg1	−1·7	−5·7	V
Ia	1·2	39	mA
Ig2	—	6·5	mA
gm	1·6	10·5	mA/V
ra	—	45	kΩ
μg1−g2	—	21	

PCL805/85

TRIODE OUTPUT PENTODE
(pa max. = 7W)

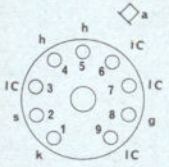


B9A

Ih	300		mA
Vh	18		V
	Triode	Pentode	
Va	100	170	V
Vg2	—	170	V
Vg1	0	−15	V
Ia	10	41	mA
Ig2	—	2·7	mA
gm	5·5	7·25	mA/V
ra	9	25	kΩ
μg1−g2	—	7·0	

PD500

SHUNT STABILISER TRIODE FOR COLOUR TV

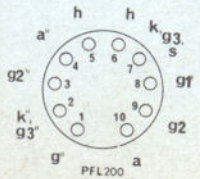


B9D

Ih	300	mA
Vh	7·3	V
Va	25	kV
Vs	0	V
Vg at Ia = 1·5 mA	−7 to −30	V
Vg max. at Ia = 0·1 mA	−40	V

PFL200

DOUBLE PENTODE
(pa max. (output section) = 5W)

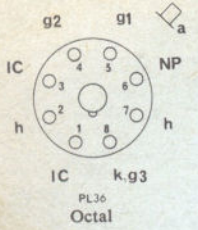


B10B

Ih	300		mA
Vh	16·5		V
	Amplifier section	Output section	
Va	150	170	V
Vg2	150	170	V
Vg1	−2·3	−2·6	V
Ia	10	30	mA
Ig2	3·0	6·5	mA
gm	8·5	21	mA/V
μg1−g2	35	32	
ra	160	40	kΩ

PL36

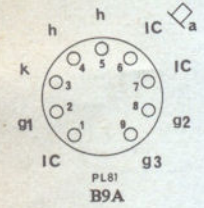
LINE TIMEBASE OUTPUT PENTODE (pa max.=12W)



Ih	300	mA
Vh	25	V
Va	100	V
Vg2	100	V
Vg1	−8·2	V
Ia	100	mA
Ig2	7·0	mA
gm	14	mA/V
μg1–g2	5·6	

PL81

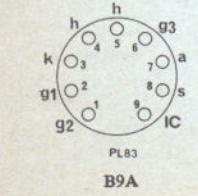
LINE TIMEBASE OUTPUT PENTODE (pa max.=8W)



Ih	300	mA
Vh	21·5	V
Va	170	V
Vg2	170	V
Vg3	0	V
Vg1	−24	V
Ia	45	mA
Ig2	3·0	mA
gm	6·5	mA/V
μg1–g2	5·5	

PL83

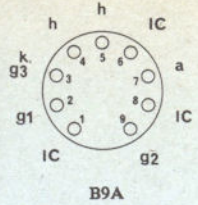
VIDEO OUTPUT PENTODE (pa max.=9W)



Ih	300		mA
Vh	15		V
Va	170	200	V
Vg2	170	200	V
Vg3	0	0	V
Vg1	−2·3	−3·5	V
Ia	36	36	mA
Ig2	5·0	5·0	mA
gm	10	10	mA/V
μg1–g2	24	24	

PL84

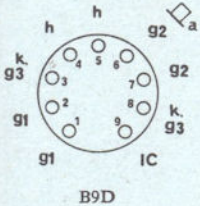
OUTPUT PENTODE (pa max.=12W)



Ih	300		mA
Vh	15		V
Va	170	200	V
Vg2	170	200	V
Vg1	−12·5	−17·3	V
Ia	70	60	mA
Ig2	3·5	3·0	mA
gm	11	8·8	mA/V
ra	26	28	kΩ
μg1–g2	8·0	8·0	

PL504

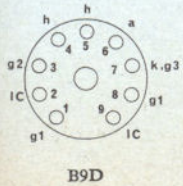
LINE OUTPUT PENTODE (pa max.=12W) Replaces PL500



Ih	300	mA
Vh	27	V
Dynamic characteristics		
Va	75	V
Vg2	200	V
Vg1	−10	V
Ia	440	mA
Ig2	30	mA

PL508

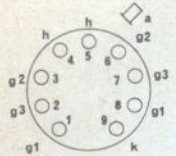
FIELD OUTPUT PENTODE FOR COLOUR TV



Ih	300	mA
Vh	17	V
Va	190	V
Vg2	190	V
Ia	60	mA
Ig2	4·5	mA
Vg1	−17	V
gm	9·0	mA/V
μg1–g2	7·0	
ra	10	kΩ

PL509

LINE OUTPUT PENTODE FOR COLOUR TV (pa max.=30W)

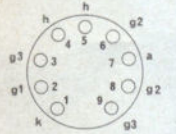


B9D

Ih	300	mA
Vh	40	V
Va	160	V
Vg3	0	V
Vg2	160	V
Vg1	0	V
Ia	1·4	A
Ig2	45	mA

PL802

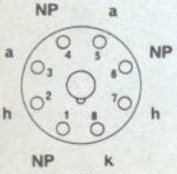
VIDEO OUTPUT PENTODE FOR COLOUR TV



Ih	300	mA
Vh	16	V
Va	170	V
Vg3	0	V
Vg2	170	V
Vg1	−0·9	V
Ia	30	mA
Ig2	6·5	mA
gm	40	mA/V
ra	45	kΩ
μg1–g2	70	

PY33

HALF-WAVE RECTIFIER

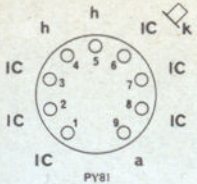


PY33
Octal

Ih	300	mA
Vh	29	V
P.I.V. max.	700	V
Vin(r.m.s.)	200	V
Iout max.	325	mA
C max.	200	μF
Rlim min.	15	Ω

PY81/800

BOOSTER DIODE

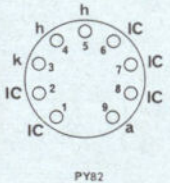


PY81
B9A

Ih	300	mA
Vh	19	V
P.I.V. max.	5·75	kV
Ia(av) max.	175	mA
vh–k(pk) max. (cathode positive)	6·0	kV

PY82

HALF-WAVE RECTIFIER

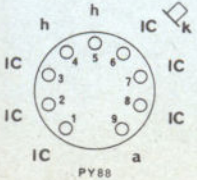


PY82
B9A

Ih	300	mA
Vh	19	V
P.I.V.	700	V
Vin(r.m.s.) max.	250	V
Iout max.	180	mA
C max.	60	μF
Rlim min.	45	Ω

PY88

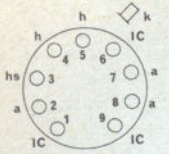
BOOSTER DIODE



PY88
B9A

Ih	300	mA
Vh	30	V
P.I.V. max.	6·6	kV
Ia(av) max.	220	mA
vh–k(pk) max. (cathode positive)	6·6	kV

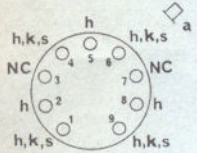
PY500 — BOOSTER DIODE FOR COLOUR TV



B9D

Ih	300	mA
Vh	42	V
P.I.V. max.	5·6	kV
Ia(av) max.	440	mA
vh–k(pk) max. (cathode positive)	6·3	kV

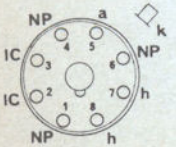
U26/KY80 — E.H.T. RECTIFIER



B9A

Ih	350	mA
Vh	2·0	V
P.I.V. max.	23·5	kV
Ia max.	0·2	mA
ia(pk) max.	60	mA

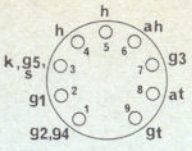
U191/PY301 — BOOSTER DIODE



Octal

Ih	300	mA
Vh	19	V
P.I.V. max.	4·5	kV
Ia(av) max.	150	mA
ia(pk) max.	450	mA
vh–k(pk) max.	4·5	kV

UCH81 — TRIODE HEPTODE FREQUENCY CHANGER

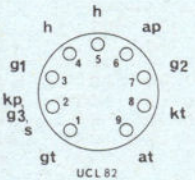


UCH81

B9A

Ih	100		mA
Vh	19		V
Vah=Vb	170	200	V
Rg+g4	10	10	kΩ
Rg3+gt	47	47	kΩ
Rk	150	150	Ω
Vg2+g4	102	119	V
Iah	3·2	3·7	mA
Ig2+g4	6·8	8·1	mA
Ig3+gt	200	230	μA
gc	750	775	μA/V
Vat	102	102	V
Iat	4·5	5·4	mA

UCL82 — TRIODE OUTPUT PENTODE (pa max.=7W)

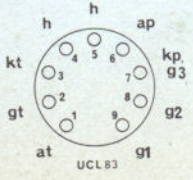


UCL82

B9A

Ih	100		mA
Vh	50		V
	Triode	Pentode	
Va	100	200	V
Vg2	—	200	V
Ia	3·5	35	mA
Ig2	—	7·0	mA
Vg1	0	−16	V
gm	2·5	6·4	mA/V
Ra	—	5·6	kΩ
Pout	—	3·5	W

UCL83 — TRIODE OUTPUT PENTODE (pa max.=5·4W)

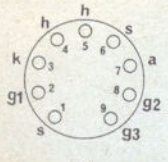


UCL83

B9A

Ih	100		mA
Vh	38		V
	Triode	Pentode	
Va	170	170	V
Vg2	—	170	V
Vg1	−1·5	−9·5	V
Ia	1·6	30	mA
Ig2	—	5·0	mA
gm	2·1	5·5	mA/V
μ	82	—	
Ra	—	5·5	kΩ
Pout	—	2·2	W

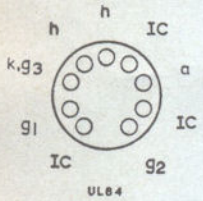
UF89 — VARIABLE-MU R.F. PENTODE



B9A

Ih	100		mA
Vh	12·6		V
Va	170	200	V
Vg3	0	0	V
Rg2	15	24	kΩ
Rk	130	130	Ω
Ia	11	11·1	mA
Ig2	3·9	3·8	mA
gm	3·8	3·85	mA/V

UL84 — OUTPUT PENTODE (pa max.=12W)

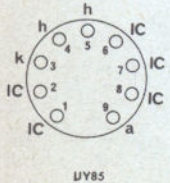


B9A

Ih	100			mA
Vh	45			V
Va	100	170	200	V
Vg2	100	170	*	V
Rk	150	170	270	Ω
Ia	43	70	60	mA
Ig2	3·0	5·0	4·1	mA
gm	9·0	10	8·8	mA/V
Ra	2·4	2·4	2·4	kΩ
Pout	1·9	5·6	5·2	W

*Vg2(b)=200V, Rg2=470Ω

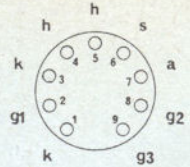
UY85 — HALF-WAVE RECTIFIER



B9A

Ih	100	mA
Vh	38	V
Vin(r.m.s.)	250	V
Iout max.	110	mA
C max.	100	μF
Rlim min.	100	Ω

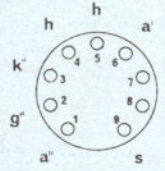
6F23/EF812 — HIGH SLOPE R.F. PENTODE



B9A

Vh	6·3	V
Ih	300	mA
Va	170	V
Vg2	170	V
Rk	150	Ω
Ia	10	mA
Ig2	2·6	mA
gm	9·2	mA/V
μg1–g2	60	

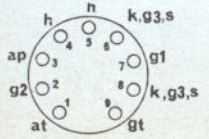
6/30L2/ECC804 — DOUBLE TRIODE (separate cathodes)



B9A

Vh	6·3	V
Ih	300	mA
Characteristics (each section)		
Va	200	V
Vg	−7·7	V
Ia	10	mA
gm	3·4	mA/V
μ	18	

30C18/PCF805 — V.H.F. TRIODE PENTODE

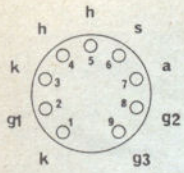


B9A

(Shield completely surrounds pentode)

Ih	300		mA
Vh	7·4		V
Va	100	125	V
Vg2	—	125	V
Vg1	−3·0	−1·5	V
Ia	14	10	mA
Ig2	—	3·1	mA
gm	5·5	11	mA/V
μ	17	—	
μg1–g2	—	50	

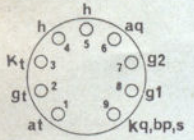
30F5/PF818 H.F. SCREENED PENTODE (pa max.=3W)



B9A

Ih	300	mA
Vh	7·3	V
Va	170	V
Vg3	0	V
Vg2	170	V
Vg1	−1·9	V
Ia	10	mA
Ig2	2·6	mA
Rk	150	Ω
gm	8·8	mA/V

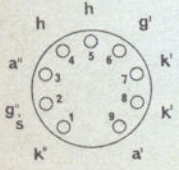
30FL1/PCE800 TRIODE BEAM TETRODE



B9A

Ih	300		mA
Vh	9·4		V
	Triode	Tetrode	
Va	200	170	V
Vg2	—	170	V
Ia	10	10	mA
gm	3·4	8·0	mA/V
μ	18	—	

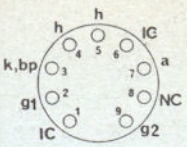
30L15/PCC805 R.F. CASCODE DOUBLE TRIODE



B9A

Ih	300	mA
Vh	7·0	V
Characteristics (each section)		
Va	90	V
Vg	−1·2	V
Ia	15	mA
gm	9·0	mA/V
μ	27	

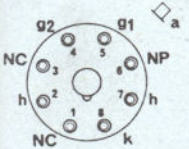
30P12/PL801 BEAM TETRODE (A.F. or field output, pa max.=6W)



B9A

Ih	300	mA
Vh	12·6	V
Va	170	V
Vg2	180	V
Vg1	−10·3	V
Ia	31	mA
Ig2	7·3	mA
Ra	5·0	kΩ
Pout	2·25	W

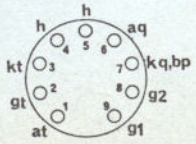
30P19/PL302 LINE OUTPUT BEAM TETRODE (pa max.=10W)



Octal

Ih	300	mA
Vh	25	V
Va max.	400	V
Va(pk) max.	7·0	kV
Vg2 max.	250	V
Vg2(pk) max.	2·0	kV
Ik max.	200	mA
Rg1–k max.	1·0	MΩ
Vh–k(r.m.s.) max.	200	V

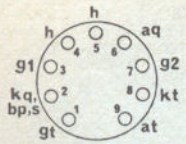
30PL1/PCL801 TRIODE BEAM TETRODE (A.F. or field output)



B9A

Ih	300		mA
Vh	13		V
	Triode	Tetrode	
Va	200	170	V
Vg2	—	180	V
Ia	10	32	mA
gm	3·4	1·2	mA/V
μ	18	—	

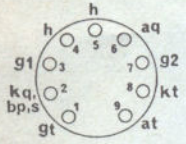
30PL13/PCL800 TRIODE OUTPUT BEAM TETRODE



B9A

Ih		300		mA
Vh		16		V
		Triode	Tetrode	
Va		100	170	V
Vg2		—	170	V
Ia		10	45	mA
Ig2		—	8·7	mA
gm		4·3	7·5	mA/V
μ		18	—	

30PL14/PCL88 TRIODE OUTPUT BEAM TETRODE



B9A

Ih		300		mA
Vh		16		V
		Triode	Tetrode	
Va		100	170	V
Vg2		—	170	V
Ia		10	50	mA
gm		4·3	7·3	mA/V
μ		18	—	

VALVE EQUIVALENTS

† Valves having a different heater current, and therefore not direct replacement in a.c./d.c. receivers.

Type	Mullard Equivalent	Type	Mullard Equivalent
AZ31	AZ31	ECC189	ECC189
B109	UCC85	ECC804	6/30L2/ECC804
B309	ECC81	ECF80	ECF80
B319	PCC84	ECF82	ECF82
B329	ECC82	ECF86	ECF86
B339	ECC83	ECH42	ECH42
B349	30L15/PCC805	ECH81	ECH81
B719	ECC85	ECH83	ECH83
B729	6/30L2/ECC804	ECH84	ECH84
CY30	U301/CY30	ECL80	ECL80
D77	EB91	ECL82	ECL82
DAF96	DAF96	ECL83	ECL83
DF96	DF96	ECL86	ECL86
DH109	UABC80	EF36	EF37A
DH118	UBC41	EF37	EF37A
DH119	UBC81	EF37A	EF37A
DH142	UBC41	EF40	EF40
DH150	EBC41	EF41	EF41
DH718	EBC41	EF80	EF80
DH719	EABC80	EF83	EF83
DK96	DK96		
DL96	DL96	EF85	EF85
DM70	DM70	EF86	EF86
DM71	DM71	EF89	EF89
DY51	DY51	EF91	EF91
DY86	DY86/87	EF92	EF92
DY87	DY86/87	EF95	EF95
DY802	DY802	EF183	EF183
EABC80	EABC80	EF184	EF184
EAF42	EAF42	EF812	6F23/EF812
EB91	EB91	EH90	EH90
EBC41	EBC41	EL34	EL34
EBC81	EBC81	EL36	EL36
EBF80	EBF80	EL41	EL41
EBF83	EBF83	EL42	EL42
EBF89	EBF89	EL81	EL81
EC86	EC86	EL84	EL84
EC88	EC88	EL85	EL85
ECC32	ECC32	EL86	EL86
ECC33	ECC33	EL91	EL91
ECC81	ECC81	EL95	EL95
ECC82	ECC82	EL821	EL821
ECC83	ECC83	ELL80	ELL80
ECC84	ECC84	EM34	EM34
ECC85	ECC85	EM81	EM81
ECC88	ECC88	EM84	EM84

Type	Mullard Equivalent	Type	Mullard Equivalent
EM87	EM87	PCC89	PCC89
EM840	EM841	PCC189	PCC189
EY51	EY51	PCC805	3L15/PCC805
EY86	EY86/87	PCE800	30FL1/PCE800
EY87	EY86/87	PCF80	PCF80
EY88	EY88	PCF82	PCF82
EZ35	EZ35	PCF84	PCF84
EZ40	EZ40	PCF86	PCF86
EZ41	EZ41	PCF200	PCF200
EZ80	EZ80	PCF201	PCF201
EZ81	EZ81	PCF800	30C15/PCF800
GY501	GY501	PCF801	PCF801
GZ32	GZ32	PCF802	PCF802
GZ34	GZ34	PCF805	30C18/PCF805
KY50	U25/KY50	PCF806	PCF806
KY80	U26/KY80	PCH200	PCH200
LN119	UCL82	PCL82	PCL82
LN152	ECL80	PCL83	PCL83
LN319	30PL1/PCL801	PCL84	PCL84
LZ319	PCF80	PCL85	PCL805/85
LZ329	PCF80	PCL86	PCL86
LZ339	30C15/PCF800	PCL88	30PL14/PCL88
N25	DL96	PCL800	30PL13/PCL800
N77	EL91	PCL801	30PL1/PCL801
N119	UL84	PCL805	PCL805/85
N142	UL41	PD500	PD500
N144	EL91	PF818	30F5/PF818
N150	EL41	PFL200	PFL200
N151	EL42	PL36	PL36
N152	PL81	PL81	PL81
N155	EL85	PL81A	PL81A
N309	PL83	PL82	PL82
N329	PL82	PL83	PL83
N369	30P12/PL801	PL84	PL84
N379	PL84	PL302	30P19/PL302
N389	30P19/PL302	PL500	PL504
N709	EL84	PL504	PL504
PABC80	PABC80	PL505	PL509
PC86	PC86	PL508	PL508
PC88	PC88	PL509	PL509
PC97	PC97	PL801	30P12/PL801
PC900	PC900	PL802	PL802
PCC84	PCC84	PL820	PL820
PCC85	PCC85	PY33	PY33
PCC88	PCC88	PY81	PY81/800

Type	Mullard Equivalent	Type	Mullard Equivalent
PY82	PY82	UY85	UY85
PY88	PY88	W25	DF96
PY301	U191/PY301	W77	EF92
PY500	PY500	W142	UF41
PY800	PY81/800	W150	EF41
R12	EY51	W719	EF85
R20	U26/KY80	WD119	UBF89
U25	U25/KY50	WD142	UAF42
U26	U26/KY80	WD709	EBF80
U43	EY51	X25	DK96
U47	U25/KY50	X119	UCH81
U49	U26/KY80	X142	UCH42
U70	EZ35	X150	ECH42
U119	UY85	X719	ECH81
U142	UY41	Y25	DM71
U143	AZ31	Z77	EF91
U147	EZ35	Z329	30F5/PF818
U150	EZ40	Z719	EF80
U151	EY51	Z729	EF86
U153	PY81	Z749	6F23/EF812
U191	U191/PY301	ZD25	DAF96
U192	PY82	1C3	DK96
U301	U301/CY30	1FD1	DAF96
U319	PY82	1M1	DM70
U339	U191/PY301	1P1	DL96
U381	UY85	6AK5	EF95
U709	EZ81	6AL5	EB91
UABC80	UABC80	6AM5	EL91
UAF42	UAF42	6AM6	EF91
UBC41	UBC41	6C10	ECH42
UBC81	UBC81	6C12	ECH81
UBF80	UBF80	6CB6	6CB6
UBF89	UBF89	6CH6	EL821
UCC85	UCC85	6CW5	EL86
UCH42	UCH42	6D2	EB91
		6F12	EF91
UCH81	UCH81	6F19	EF85
UCL82	UCL82	6F23	6F23/EF812
UCL83	UCL83	6F26	EF85
UF41	UF41	6F29	EF183
UF89	UF89	6F30	EF184
UL41	UL41	6FD12	EBF89
UL84	UL84	6L12	ECC85
UU12	EZ81	6L13	ECC83
UY41	UY41	6LD3	EBC41
UY42	UY41	6LD12	EABC80

Type	Mullard Equivalent	Type	Mullard Equivalent
6LD13	EBC81	12AU7	ECC82
6P15	EL84	12AX7	ECC83
6X5GT	EZ35	30C1	PCF80
6/30L2	6/30L2/ECC804	30C15	30C15/PCF800
8D3	EF91	30C18	30C18/PCF805
9D6	EF92	30F5	30F5/PF818
10C14	UCH81	30FL1	30FL1/PCE800
10FD12	UBF89	30L1	PCC84
10L14	UCC85	30L15	30L15/PCC805
10LD3	UBC41	30P12	30P12/PL801
10LD12	UABC80	30P16	PL82
10LD13	UBC81	30P18	PL84
10P18	UL84	30P19	30P19/PL302
10PL12	UCL82	30PL1	30PL1/PCL801
12AT7	ECC81	30PL13	30PL13/PCL800
		30PL14	30PL14/PCL88

TELEVISION PICTURE TUBE TYPE NOMENCLATURE SYSTEM

All new Mullard picture tubes are registered internationally with Pro-Electron and have type numbers according to the following code, based on the Pro-Electron type nomenclature system for cathode ray tubes.

The type number consists of a single letter followed by two sets of figures ending with a letter.

The first letter, A, indicates that the tube is a television display tube for domestic applications.

The first group of figures indicates the approximate diagonal of the screen in cm

Thus 47 represents a 47cm (19in) screen
59 represents a 59cm (23in) screen

The second group of figures is a two or three figure serial number indicating a particular design or development.

The final letter indicates the properties of the phosphor screen

Thus W indicates a white fluorescence
X indicates a tri-colour screen

Examples

A47–26W Domestic television picture tube with 47cm (19in) 'black-and-white' screen

A63–120X Domestic television picture tube with 63cm (25in) 'colour' screen

OLD SYSTEM

Earlier picture tubes have numbers consisting of two letters followed by two sets of figures.

The first letter indicates the method of deflection and focusing

A Electrostatic focusing, magnetic deflection
M Magnetic focusing and deflection

The second letter, W, indicates the white phosphor for 'black-and-white' picture tubes.

The first group of figures immediately following the letters, indicates the approximate diagonal of the screen in cm.

The second group of figures is a serial number indicating a particular design or development.

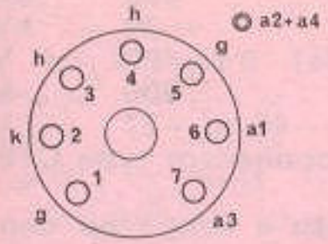
Examples:

AW53-88 Cathode ray tube with 53cm (21in) 'black-and-white' screen and employing magnetic deflection and electrostatic focusing

MW53-80 Cathode ray tube with 53cm (21in) 'black-and-white screen and employing magnetic deflection and focusing.

A28–14W

28cm (11in) Television tube. Electrostatic focusing, 90° magnetic deflection angle. Metal-backed screen and reinforced envelope. A separate safety screen is not required.



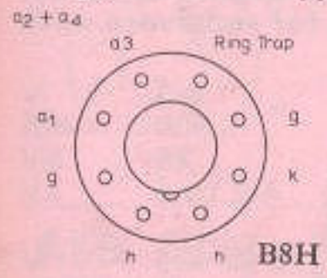
Special 7-pin

Vh	11	V
Ih	75	mA
Va2+a4	11	kV
Va3 (focus electrode)	0 to 350	V
Va1	250	V
Vg for cut-off	−35 to −69	V

Final anode cavity connector type CT8.

A44–120W/R

44cm (17in) Television tube. Electrostatic focusing. 110° magnetic deflection angle. Metal-backed screen and reinforced envelope. A separate safety screen is not required. This tube is fitted with a ring trap base.



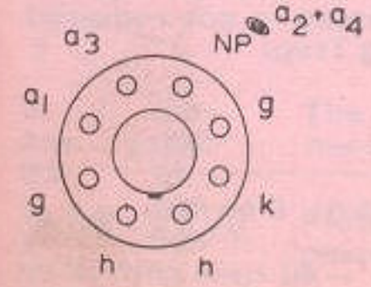
B8H

Vh	6·3	V
Ih	300	mA
Va2+a4	18	kV
Va3 (focus electrode)	0 to 400	V
Val	400	V
Vg for cut-off	−40 to −77	V

Final anode cavity connector type CT8.

A47–14W

47cm (19in) Television tube. Electrostatic focusing. 110° magnetic deflection. Metal-backed screen.

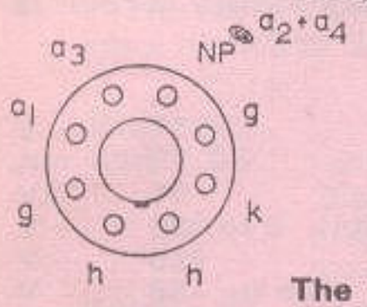


Vh	6·3	V
Ih	300	mA
Va2+a4	20	kV
Va3 (focus electrode)	0 to 400	V
Va1	400	V
Vg for cut-off	−40 to −77	V

Final anode cavity connector type CT8.

A47–26W
A47-26W/R

47cm (19in) Television tube.
Electrostatic focusing, 110° magnetic deflection angle. Metal-backed screen and reinforced envelope. A separate safety screen is not required.



B8H

Vh	6·3	V
Ih	300	mA
Va2+a4	20	kV
Va3 (focus electrode)	0 to 400	V
Va1	400	V
Vg for cut-off	−40 to −77	V

Final anode cavity connector type CT8.

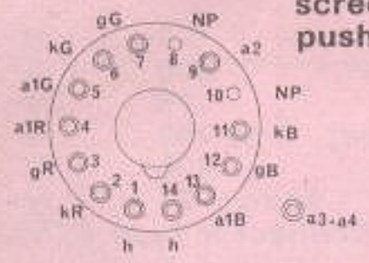
The A47–26W/R is fitted with a ring trap connected to pin 5.

A47–26W
including kit

Picture tube together with conversion kit for replacement of the 19-in twin panel tube A47–13W.

A49–120X

49cm (19in) shadow-mask colour Television tube. Electrostatic focusing, 90° magnetic deflection angle. Metal-backed 3-colour phosphor-dot screen. Reinforced envelope. A separate safety screen is not required. Suitable for receivers with push-through presentation.



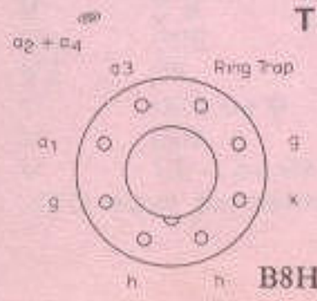
Vh	6·3	V
Ih	900	mA
Va3+a4	25	kV
Va2 (focus electrode)	4·2 to 5	kV
*Va1 (at Vg = −100 V)	210 to 495	V
*Vg (at Va2 = 300 V)	−65 to −135	V

Final anode cavity connector type CT8.

*For visual extinction of focused raster.

A50–120W/R

50cm (20in) Television tube.
Electrostatic focusing, 110° magnetic deflection angle. Metal-backed screen and reinforced envelope. A separate safety screen is not required. This tube is fitted with a Ring Trap.



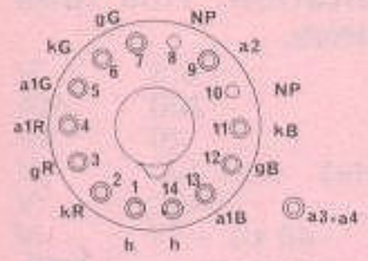
B8H

Vh	6·3	V
Ih	300	mA
Va2+a4	20	kV
Va3 (focus electrode)	0 to 400	V
Va1	400	V
Vg for cut-off	−40 to −77	V

Final anode cavity connector type CT8.

A56–120X

56cm (22in) shadow-mask colour Television tube. Electrostatic focusing, 92° magnetic deflection angle. Metal-backed 3-colour phosphor-dot screen. Reinforced envelope. A separate safety screen is not required.



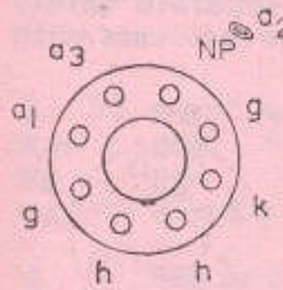
Vh	6·3	V
Ih	900	mA
Va3+a4	25	kV
Va2 (focus electrode)	4·5 to 5	kV
*Va1 (at Vg = −100 V)	210 to 495	V
*Vg (at Va1 = 300V)	−65 to −135	V

Final anode cavity connector type CT8.

*For visual extinction of raster.

A59–15W

58cm (23in) Television tube.
Electrostatic focusing, 110° magnetic deflection.
Metal-backed screen.



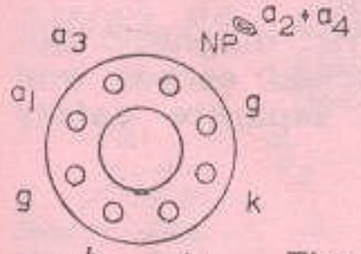
B8H

Vh	6·3	V
Ih	300	mA
Va2+a4	20	kV
Va3 (focus electrode)	0 to 400	V
Va1	400	V
Vg for cut-off	−40 to −77	V

Final anode cavity connector type CT8.

A59–23W
A59–23W/R

59cm (23in) Television tube.
Electrostatic focusing, 110° magnetic deflection angle. Metal-backed screen and reinforced envelope. A separate safety screen is not required.



B8H

Vh	6·3	V
Ih	300	mA
Va2+a4	20	kV
Va3 (focus electrode)	0 to 400	V
Va1	400	V
Vg for cut-off	−40 to −77	V

Final anode cavity connector type CT8.

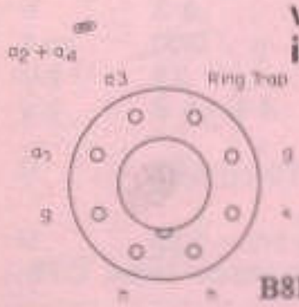
The A59–23W/R is fitted with a ring trap connected to pin 5.

A59–23W
including kit

Picture tube together with conversion kit for replacement of the 23-in twin panel tube A59–16W.

A61–120W/R

61cm (24in) Television tube.
Electrostatic focusing, 110° magnetic deflection angle. Metal-backed screen and reinforced envelope. A separate safety screen is not required. Suitable for use in receivers with push-through presentation. This tube is fitted with a ring trap base.

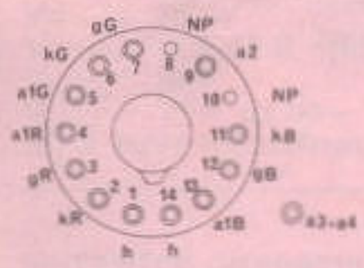


Vh	6·3	V
Ih	300	mA
Va2+a4	20	kV
Va3 (focus electrode)	0 to 400	V
Va1	400	V
Vg for cut-off	−40 to −77	V

Final anode cavity connector type CT8.

A63–120X

63cm (25in) shadow-mask colour Television tube.
Electrostatic focusing, 90° magnetic deflection angle. Metal-backed 3-colour phosphor-dot screen. Reinforced envelope. A separate safety screen is not required. Suitable for receivers with push-through presentation.

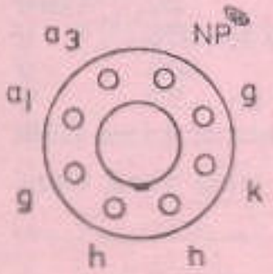


Vh	6·3	V
Ih	900	mA
Va3+a4	25	kV
Va2 (focus electrode)	4·2 to 5	kV
*Va1 (at Vg = −100 V)	210 to 495	V
*Vg (at Va1 = 300 V)	−65 to −135	V

*For visual extinction of focused raster.

A65–11W

65cm (25in) Television tube.
Electrostatic focusing, 110° magnetic deflection angle. Metal-backed screen and reinforced envelope. A separate safety screen is not required.

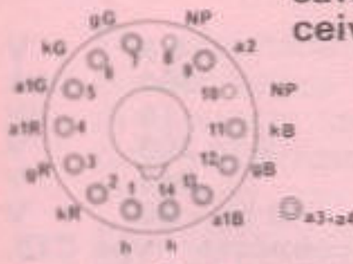


Vh	6·3	V
Ih	300	mA
Va2+a4	20	kV
Va3 (focus electrode)	0 to 400	V
Va1	400	V
Vg for cut-off	−40 to −77	V

Final anode cavity connector type CT8.

A66–120X

66cm (26in) shadow-mask colour Television tube.
Electrostatic focusing, 92° magnetic deflection angle. Metal-backed 3-colour phosphor-dot screen. Reinforced envelope. A separate safety screen is not required. Suitable for receivers with push-through presentation.



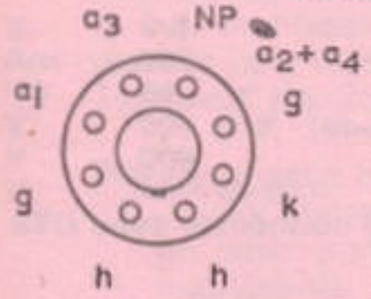
Vh	6·3	V
Ih	900	mA
Va3+a4	25	kV
Va2 (focus electrode)	4·2 to 5	kV
*Va1 (at Vg = −100 V)	210 to 495	V
*Vg (at Va1 = 300 V)	−65 to −135	V

*For visual extinction of focused raster.

Final anode cavity connector type CT8.

AW43–88

43cm (17in) Television tube.
Electrostatic focusing, 110° magnetic deflection. Metal-backed screen.

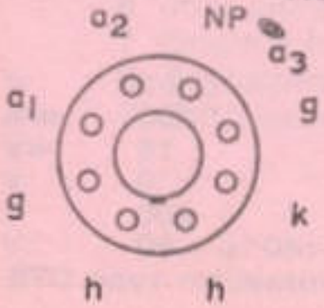


Vh	6·3	V
Ih	300	mA
Va2+a4	16	kV
Va3 (focus electrode)	0 to 400	V
Va1	400	V
Vg for cut-off	−38 to −94	V

Final anode cavity connector type CT8.

AW43–89

43cm (17in) Television tube
Electrostatic focusing, 110° magnetic deflection. Short neck. Metal-backed screen.

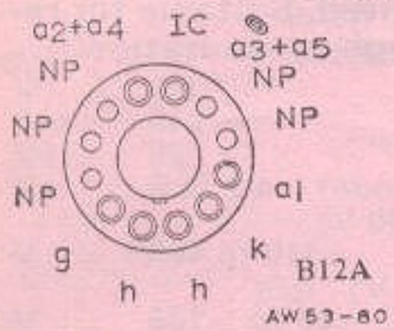


Vh	6·3	V
Ih	300	mA
Va3	16	kV
Va2 (focus electrode)	0 to 400	V
Va1	500	V
Vg for cut-off	−35 to −75	V

Final anode cavity connector type CT8.

AW53–80

53cm (21in) Television tube. Electrostatic focusing. 90° magnetic deflection. Incorporates ion trap. Ion trap magnet IT9, centring magnet BC11. Metal-backed screen.

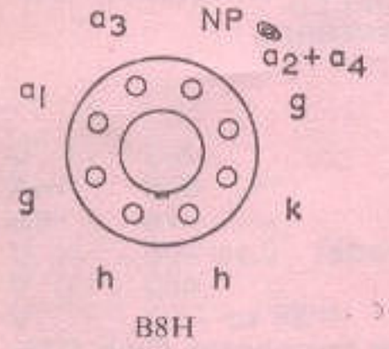


Vh	6·3	V
Ih	300	mA
Va3+a5	16	kV
Va2+a4	0 to 200	V
Va1	300	V
Vg for cut-off	−40 to −80	V

Final anode cavity connector type CT8.

AW53–88

53cm (21in) Television tube. Electrostatic focusing, 110° magnetic deflection. Metal-backed screen.

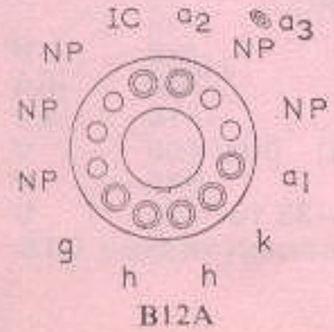


Vh	6·3	V
Ih	300	mA
Va2+a4	16	kV
Va3 (focus electrode)	0 to 400	V
Va1	400	V
Vg for cut-off	−38 to −94	V

Final anode cavity connector type CT8.

MW53–80

53cm (21in) Television tube. Magnetic focusing, 90° magnetic deflection. Incorporates ion trap. Ion trap magnet IT9. Metal-backed screen.



Vh	6·3	V
Ih	300	mA
Va3	16	kV
Va2	0	V
Va1	300	V
Vg for cut-off	−40 to −80	V

Final anode cavity connector type CT8.

TELEVISION PICTURE TUBE REPLACEMENTS

The information supplied in the replacement list is based on similarities of published electrical, mechanical and dimensional specifications. In undertaking any picture tube replacements, please observe all relevant instructions and specifications of the tube maker and/or set manufacturer, in particular, insulation, alignment, mounting and handling of the picture tube.

In case of replacement by a similar type make sure that base pin arrangements are electrically and dimensionally identical. Careful attention must be paid to possible differences in specifications.

If the above mentioned precautions are taken, a Mullard picture tube used as a replacement is covered by its normal guarantee.

Full technical information on Mullard Picture Tubes used in new receiver designs is published in the Mullard Technical Handbook Book 2 Part 1, November 1970.

Replacement information

1. "Inckit" types include kit which enables the majority of twin panel tubes to be replaced by modern equivalents.
2. Original has 12·6V heater. Connect 21Ω, 2W resistor in series with the heater.
3. Fit and adjust ion-trap magnet type IT9.
4. Original has light screen tint (75%).
5. Replacement max. final anode voltage = 18kV.
6. Join pin 7 to pin 11.
7. Original has 4V heater.
8. Replacement is 1 inch shorter.
9. Earth external conductive coating.

TELEVISION PICTURE TUBE REPLACEMENTS

Type to be Replaced	Mullard Type	Notes
A28–14W	A28–14W	
A44–120W/R	A44–120W/R	
A47–11W	A47–26W	
A47–13W	A47–26W/inckit	1
A47–14W	A47–14W	
A47–15W	A47–14W	
A47–17W	A47–26W	
A47–18W	A47–26W	4
A47–25W	A47–26W	
A47–26W	A47–26W	
A47–26W/ inckit	A47–26W/inckit	1
A47–26W/R	A47–26W/R	
A47–27W	A47–26W	
A47–28W	A47–26W	
A47–28W/R	A47–26W/R	
A49–11X	A49–120X	
A49–15X	A49–120X	
A49–18X	A49–120X	
A49–191X	A49–120X	
A49–120X	A49–120X	
A49–200X	A49–120X	
A50–120W/R	A50–120W/R	
A56–120X	A56–120X	
A59–11W	A59–23W	
A59–12W	A59–23W	
A59–13W	A59–23W/inckit	1
A59–14W	A59–23W/inckit	1
A59–15W	A59–15W	
A59–16W	A59–23W/inckit	1
A59–23W	A59–23W	
A59–23W/R	A59–23W/R	
A59–25W	A59–23W	
A61–120W/R	A61–120W/R	
A63–11X	A63–120X	
A63–120X	A63–120X	
A63–200X	A63–120X	
A65–11W	A65–11W	
A66–120X	A66–120X	
AW43–88	AW43–88	
AW43–89	AW43–89	
AW47–90	A47–14W	4, 8
AW47–91	A47–14W	4
AW47–97	A47–14W	2, 4, 8
AW53–80	AW53–80	
AW53–88	AW53–88	
AW59–90	A59–15W	4, 8
AW59–91	A59–15W	4
AW59–95	A59–15W	2, 4, 8
C17/7A	AW43–88	
C17AA	AW43–88	
C17AF	AW43–89	7
C19/7A	A47–14W	4, 8
C19/10A	A47–14W	4
C19/10AP	A27–26W/inckit	1
C19AK	A47–14W	4, 8
C21/1A	MW53–80	6
C21/7A	AW53–88	
C21AA	AW53–88	
C21KM	MW53–80	
C21SM	AW53–80	3, 8
C21TM	MW53–80	2, 6
C23/7A	A59–15W	4, 8
C23/10A	A59–15W	4
C23/10AP	A59–23W/inckit	1
C23AK	A59–15W	4, 8
C23AKT	A59–23W/inckit	1
CME1703	AW43–88	2
CME1705	AW43–89	2
CME1706	AW43–88	
CME1713R	A44–120W/R	
CME1901	A47–14W	2, 4, 8
CME1902	A47–14W	4, 8
CME1903	A47–14W	4
CME1905	A47–26W	
CME1906	A47–26W/inckit	1
CME1907	A47–26W	
CME1908	A47–14W	
CME1913	A47–26W	
CME1913R	A47–26W/R	
CME1913S	A47–26W	
CME2013R	A50–120W/R	
CME2101	AW53–88	2
CME2301	A59–15W	2, 4, 8
CME2302	A59–15W	4, 8
CME2303	A59–15W	4
CME2305	A59–23W	
CME2306	A59–23W/inckit	1
CME2308	A59–15W	
CME2312	A59–23W	
CME2313R	A59–23W/R	
CME2313S	A59–23W	
CME2413R	A61–120W/R	
CME2501	A65–11W	
CRM212	MW53–80	2, 5, 6
MW53–80	MW53–80	
TR21/20	MW53–80	6, 9
TR21/21	MW53–80	6
17CVP4	AW43–88	
21CLP4	AW53–80	
21DKP4	AW53–88	
21DKP4A	AW53–88	
23DGP4	A59–23W/inckit	1
23DHP4	A59–23W/inckit	1
23SP4	A59–23W/inckit	1
25UP22	A63–120X	
212K	MW53–80	
7405A	AW43–88	2
7406A	AW43–89	2
7502A	MW53–80	2, 5, 6
7503A	AW53–88	2
7601A	A47–14W	2, 4, 8
7701A	A59–15W	2, 4, 8

LARGE ELECTROLYTIC CAPACITORS 071 SERIES

These characteristics refer to an ambient temperature of 20 ±5°C, a frequency of 100 Hz, an atmospheric pressure of 1000 mbars and a relative humidity of 75% max.

CAPACITANCE RANGE:	680	to	22 000	μF
TOLERANCE ON CAPACITANCE:	−10	to	+50	%
RATED VOLTAGE RANGE:	6·3	to	63	V
TEMPERATURE RANGE:	−40	to	+85	°C

Rated Voltage (V)	Capacitance (μF)	Type Number	Dimensions in mm		
			Max. diameter	Max. body length	Min. tag length
6·3	10 000	071 13103	25·6	50·3	8
	15 000	071 13153	25·6	81·3	12
	22 000	071 13223	30·6	81·3	12
10	4700	071 14472	21·6	50·3	8
	6800	071 14682	25·6	50·3	8
	10 000	071 14103	25·6	81·3	12
	15 000	071 14153	30·6	81·3	12
16	3300	071 15332	21·6	50·3	8
	4700	071 15472	25·6	50·3	8
	6800	071 15682	25·6	81·3	12
	10 000	071 15103	30·6	81·3	12
25	2200	071 16222	21·6	50·3	8
	3300	071 16332	25·6	50·3	8
	4700	071 16472	25·6	81·3	12
	6800	071 16682	30·6	81·3	12
40	1000	071 17102	21·6	50·3	8
	2200	071 17222	25·6	50·3	8
	3300	071 17332	25·6	81·3	12
	4700	071 17472	30·6	81·3	12
63	680	071 18681	21·6	50·3	8
	1000	071 18102	25·6	50·3	8
	1500	071 18152	25·6	81·3	12
	2200	071 18222	30·6	81·3	12

MINIATURE ELECTROLYTIC CAPACITORS
C426, C437 Series

TOLERANCES	WORKING TEMPERATURES	LEAKAGE CURRENT
−10 to +100% for can size 1N −10 to +50% for can sizes 2N-6N and 00-03	Minimum: −40°C Maximum continuous: Size 1N 60°C Other sizes 70°C	After 5 minutes operation at 20°C: $I \leqslant 80 \times 10^3 CV$ After prolonged operation at 20°C: $I \leqslant 16 \times 10^3 CV$ After continuous operation at max. temp.: $I \leqslant 80 \times 10^3 CV$ where: I is leakage current in μA C is capacitance in F V is max. voltage in V

DIMENSIONS

Can size	BODY		Leads (mm)
	Length (mm)	Dia. (mm)	
1N	10·5	3·4	0·6 (23 s.w.g. approx.) × 34
2N	10·5	4·8	0·6 (23 s.w.g. approx.) × 34
3N	10·5	6·1	0·6 (23 s.w.g. approx.) × 34
4N	18·5	6·7	0·8 (21 s.w.g. approx.) × 34
5N	18·5	8·3	0·8 (21 s.w.g. approx.) × 34
6N	18·5	10·4	0·8 (21 s.w.g. approx.) × 34
00	30·5	10·4	0·8 (21 s.w.g. approx.) × 34
01	30·5	12·9	0·8 (21 s.w.g. approx.) × 34
02	30·5	15·4	0·8 (21 s.w.g. approx.) × 34
03	30·5	18·5	0·8 (21 s.w.g. approx.) × 34

Capacitance (μF)	Max. Voltage (V)	Type No. (Insulated)	Can size
10	2·5	C426AS/A10	1N
8·0	4·0	C426AS/B8	
6·4	6·4	C426AS/C6·4	
4·0	10	C426AS/D4	
2·5	16	C426AS/E2·5	
1·6	25	C426AS/F1·6	
1·0	40	C426AS/G1	
0·64	64	C426AS/H0·64	
40	2·5	C426AR/A40	2N
32	4·0	C426AR/B32	
25	6·4	C426AR/C25	
16	10	C426AR/D16	
10	16	C426AR/E10	
6·4	25	C426AR/F6·4	
4·0	40	C426AR/G4	
2·5	64	C426AR/H2·5	
80	2·5	C426AR/A80	3N
64	4·0	C426AR/B64	
50	6·4	C426AR/C50	
32	10	C426AR/D32	
20	16	C426AR/E20	
12·5	25	C426AR/F12·5	
8·0	40	C426AR/G8	
5·0	64	C426AR/H5	
160	2·5	C426AR/A160	4N
125	4·0	C426AR/B125	
100	6·4	C426AR/C100	
64	10	C426AR/D64	
40	16	C426AR/E40	
25	25	C426AR/F25	
16	40	C426AR/G16	
10	64	C426AR/H10	
320	2·5	C426AR/A320	5N
250	4·0	C426AR/B250	
200	6·4	C426AR/C200	
125	10	C426AR/D125	
80	16	C426AR/E80	
50	25	C426AR/F50	
32	40	C426AR/G32	
20	64	C426AR/H20	
500	2·5	C426AR/A500	6N
400	4·0	C426AR/B400	
320	6·4	C426AR/C320	
200	10	C426AR/D200	
125	16	C426AR/E125	
80	25	C426AR/F80	
50	40	C426AR/G50	
32	64	C426AR/H32	

Capacitance (μF)	Max. Voltage (V)	Type No. (Insulated)	Can size
1000	2·5	C437AR/A1000	
800	4·0	C437AR/B800	
640	6·4	C437AR/C640	
400	10	C437AR/D400	00
250	16	C437AR/E250	
160	25	C437AR/F160	
100	40	C437AR/G100	
64	64	C437AR/H64	
1600	2·5	C437AR/A1600	
1250	4·0	C437AR/B1250	
1000	6·4	C437AR/C1000	
640	10	C437AR/D640	
400	16	C437AR/E400	01
250	25	C437AR/F250	
160	40	C437AR/G160	
100	64	C437AR/H100	
2500	2·5	C437AR/A2500	
2000	4·0	C437AR/B2000	
1600	6·4	C437AR/C1600	
1000	10	C437AR/D1000	02
640	16	C437AR/E640	
400	25	C437AR/F400	
250	40	C437AR/G250	
160	64	C437AR/H160	
4000	2·5	C437AR/A4000	
3200	4·0	C437AR/B3200	
2500	6·4	C437AR/C2500	
1600	10	C437AR/D1600	
1000	16	C437AR/E1000	03
640	25	C437AR/F640	
400	40	C437AR/G400	
250	64	C437AR/H250	

POLYESTER CAPACITORS
C296 Series

Unless otherwise stated these characteristics refer to 20°C ± 5 deg. 750 ± 50mm Hg and 60 ± 15% relative humidity.

CAPACITANCE TOLERANCE: ±10%.

MAXIMUM WORKING VOLTAGE: (at temperature up to 85°C)
160 V d.c. or 90 V r.m.s. ($f \leqslant 1$ kHz) for C296AA series
400 V d.c. or 150 V r.m.s. ($f \leqslant 500$ Hz) for C296AC series

INSULATION RESISTANCE:
(*a*) at 20°C Capacitance values $\leqslant 0{\cdot}33\ \mu F$ I.R. $>50\ G\Omega$
Capacitance values $>0{\cdot}33\ \mu F$ RC product 16·5 GΩ, μF
(*b*) at 85°C Capacitance values $\leqslant 0{\cdot}33\ \mu F$ I.R. $>2{\cdot}0\ G\Omega$.
Capacitance values $>0{\cdot}33\ \mu F$ RC product 600 MΩ, μF.

POWER FACTOR: $\leqslant 60 \times 10^{-4}$ at 1 kHz.

TEMPERATURE RANGE: −40 to +100°C. For temperatures between 80 and 100°C max., the working voltage should be derated by 0·9% per deg C.

	160 V Range			
Capacitance (μF)	Type Number	Dimensions in mm		
		Max. diameter	Max. body length	Connecting wire dia.
0·01	C296AA/A10K	7·5	21	0·8 (21 s.w.g. approx.)
0·015	C296AA/A15K	7·5		
0·022	C296AA/A22K	7·5		
0·033	C296AA/A33K	7·5		
0·047	C296AA/A47K	8		
0·068	C296AA/A68K	9		
0·1	C296AA/A100K	10·5		
0·15	C296AA/A150K	12		
0·22	C296AA/A220K	10	35	0·8 (21 s.w.g. approx.)
0·33	C296AA/A330K	12		
0·47	C296AA/A470K	14		
0·68	C296AA/A680K	16		
1·0	C296AA/A1M	18·5		

400 V Range

Capacitance (μF)	Type Number	Dimensions in mm		
		Max. diameter	Max. body length	Connecting wire dia.
0·001	C296AC/A1K	7·5	21	0·8 (21 s.w.g. approx.)
0·0015	C296AC/A1K5	7·5		
0·0022	C296AC/A2K2	7·5		
0·0033	C296AC/A3K3	7·5		
0·0047	C296AC/A4K7	7·5		
0·0068	C296AC/A6K8	7·5		
0·01	C296AC/A10K	7·5		
0·015	C296AC/A15K	7·5		
0·022	C296AC/A22K	8·5		
0·033	C296AC/A33K	10		
0·047	C296AC/A47K	11·5		
0·068	C296AC/A68K	9·5	35	0·8 (21 s.w.g. approx.)
0·1	C296AC/A100K	11		
0·15	C296AC/A150K	12·5		
0·22	C296AC/A220K	14·5		
0·33	C296AC/A330K	17		
0·47	C296AC/A470K	19·5		

MINIATURE CERAMIC PLATE CAPACITORS C333 SERIES

These characteristics refer to an ambient temperature of 20 ± 5 °C, an atmospheric pressure of 1000 mbars and a relative humidity of 75% max.

WORKING VOLTAGE: 63 V

CAPACITANCE TOLERANCE:

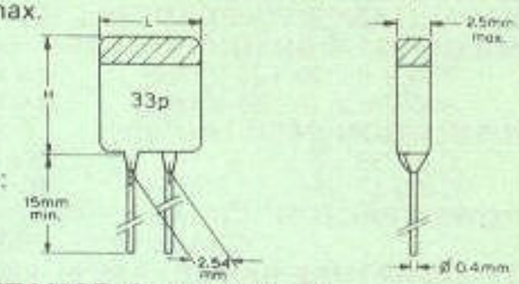
1·8 to 10 pF ±0·25 pF
12 to 330 pF ±2%

INSULATION RESISTANCE: R > 1000 MΩ

POWER FACTOR at 1 MHz and 5 V a.c. max.:

1·8 to 4·7 pF $< 55 \times 10^{-4}$
56 to 330 pF $< 15 \times 10^{-4}$

TEMPERATURE RANGE: −55 to +85 °C



TEMPERATURE COEFFICIENT OF CAPACITANCE: (p.p.m./deg. C)

1·8 to 18 pF	0	(Black)
22 to 150 pF	−150	(Orange)
180 to 330 pF	−750	(Violet)

MARKING:

The temperature coefficient is indicated by colour marking on the body as shown above. The capacitance is indicated by letters or figures in black on the body. (See Table below.)

NOTE: These capacitors are packed 500 per box.

Capacitance (pF)	Marking Code		Type Number	Max. body dimensions (mm)	
	Capacitor	Box		L	H
·1·8	W or 1p8	09188	C333CB/NIE8	3·5	4·5
2·2	X or 2p2	09228	C333CB/N2E2	3·5	4·5
2·7	Y or 2p7	09278	C333CB/N2E7	3·5	4·5
3·3	Z or 3p3	09338	C333CB/N3E3	3·5	4·5
3·9	A or 3p9	09398	C333CB/N3E9	3·5	4·5
4·7	B or 4p7	09478	C333CB/N4E7	3·5	4·5
5·6	C or 5p6	09568	C333CB/N5E6	3·5	4·5
6·8	D or 6p8	09688	C333CB/N6E8	3·5	4·5
8·2	E or 8p2	09828	C333CB/N8E2	3·5	4·5
10	F or 10p	10109	C333CB/N10E	3·5	4·5
12	G or 12p	10129	C333CB/C12E	3·5	4·5
15	H or 15p	10159	C333CB/C15E	3·5	4·5
18	J or 18p	10189	C333CB/C18E	3·5	4·5
22	K or 22p	34229	C333CC/C22E	3·5	4·5
27	L or 27p	34279	C333CC/C27E	4·5	5·5
33	M or 33p	34339	C333CC/C33E	4·5	5·5
39	39 or 39p	34399	C333CC/C39E	4·5	5·5
47	47 or 47p	34479	C333CC/C47E	4·5	5·5
56	56 or 56p	34569	C333CC/C56E	5·5	6·5
68	68 or 68p	34689	C333CC/C68E	5·5	6·5
82	82 or 82p	34829	C333CC/C82E	6·5	7·5
100	100 or n10	34101	C333CC/C100E	6·5	7·5
120	120 or n12	34121	C333CC/C120E	6·5	10·5
150	150 or n15	34151	C333CC/C150E	6·5	10·5
180	180 or n18	58181	C333CH/C180E	6·5	7·5
220	220 or n22	58221	C333CH/C220E	6·5	7·5
270	270 or n27	58271	C333CH/C270E	6·5	10·5
330	330 or n33	58331	C333CH/C330E	6·5	10·5

METALLISED FOIL CAPACITORS
C281 Series

Unless otherwise stated these characteristics refer to 20°C ± 5 deg, 760 ± 50mm Hg and 60 ± 15% relative humidity.

CAPACITANCE TOLERANCE: ±10%.

MAXIMUM WORKING VOLTAGE: (up to 85°C).

250 V d.c. or 125 V r.m.s. ($f \leqslant 100$ Hz) for C281AB series.
400 V d.c. or 250 V r.m.s. ($f \leqslant 100$ Hz) for C281CD series.

INSULATION RESISTANCE:

$C \leqslant 0{\cdot}33\ \mu F$ $R > 30\ G\Omega$.
$C \geqslant 0{\cdot}47\ \mu F$ RC product 10 GΩ, μF.

POWER FACTOR: C281AB $< 75 \times 10^{-4}$
C281CD $< 30 \times 10^{-4}$

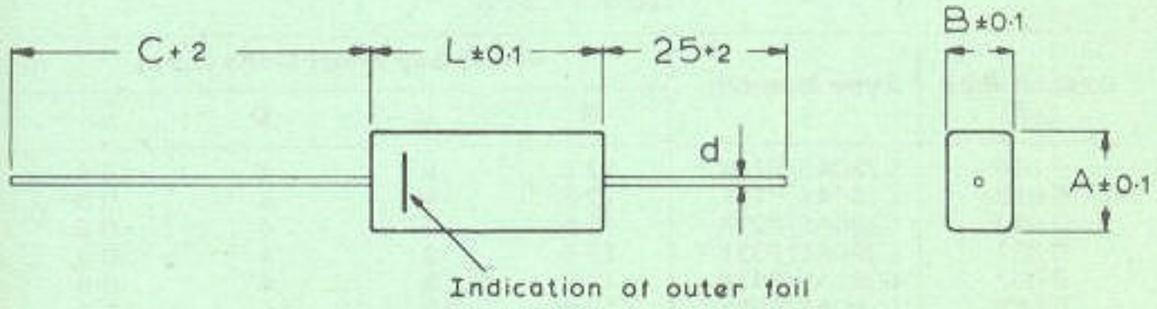
TEMPERATURE RANGE: −55 to +85°C.

250 V Range

Capacitance (μF)	Type Number	Dimensions (mm)				
		A	B	L	C	d
0·010	C281AB/A10K	8·7	4·7	14	40	0·8
0·015	C281AB/A15K					
0·022	C281AB/A22K					
0·033	C281AB/A33K					
0·047	C281AB/A47K					
0·068	C281AB/A68K	9·4	5·5			
0·10	C281AB/A100K	10·4	6·5			
0·15	C281AB/A150K	10·4	6·5	17·5		
0·22	C281AB/A220K	11·5	7·6			
0·33	C281AB/A330K	11·5	7·4	23		
0·47	C281AB/A470K	12·8	8·7			
0·68	C281AB/A680K	14·4	10·4			
1·0	C281AB/A1M	14·6	10·4	30	50	1·0
1·5	C281AB/A1M5	19·5	12·4			
2·2	C281AB/A2M2	22·0	15·0			

400 V Range

Capacitance (μF)	Type Number	Dimensions (mm)				
		A	B	L	C	d
0·010	C281CD/A10K	8·7	4·7	14	40	0·8
0·015	C281CD/A15K					
0·022	C281CD/A22K					
0·033	C281CD/A33K	9·4	5·5			
0·047	C281CD/A47K	10·4	6·5			
0·068	C281CD/A68K	10·4	6·5	17·5		
0·10	C281CD/A100K	11·5	7·6			
0·15	C281CD/A150K	11·5	7·4	23		
0·22	C281CD/A220K	12·8	8·7			
0·33	C281CD/A330K	14·4	10·4			
0·47	C281CD/A470K	14·6	10·4	30	50	1



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MINIATURE FOIL CAPACITORS
C280 Series

These characteristics refer to an ambient temperature of 20 ± 5 °C, an atmospheric pressure of 1000 mbars and a relative humidity of 75% max.

WORKING VOLTAGE: 250 V (C280AE/. . . .)
400 V (C280CF/. . . .)

CAPACITANCE TOLERANCE:
0·01 to 0·22 μF 20%
0·33 to 2·2 μF 10%

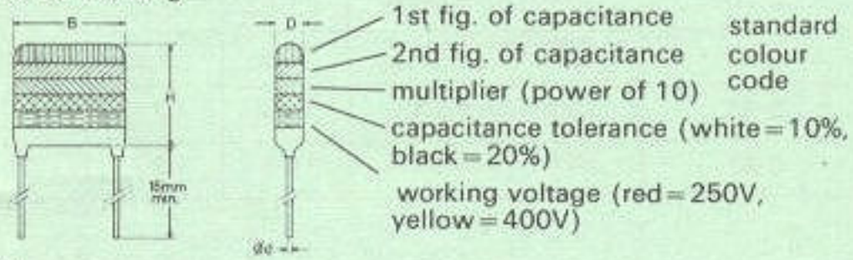
INSULATION RESISTANCE:
0·01 to 0·33 μF $R > 30\ G\Omega$
0·47 to 2·2 μF $RC > 10\ G\Omega, \mu F$

POWER FACTOR AT 1 kHz: $< 75 \times 10^{-4}$ (C280AE/. . . .)
$< 30 \times 10^{-4}$ (C280CF/. . . .)

TEMPERATURE RANGE: −40 to +85 °C

MARKING: These capacitors are coded with: Capacitance
Tolerance
Voltage

Dimensions and method of marking:–



Standard Colour Code:

Black = 0	Green = 5
Brown = 1	Blue = 6
Red = 2	Violet = 7
Orange = 3	Grey = 8
Yellow = 4	White = 9

250 V Version

Capacitance (μF)	Type Number	Max. body dimensions (mm)			
		B	H	D	d
0·010	C280AE/P10K	12·5	9	4	0·6
0·015	C280AE/P15K	12·5	9	4	0·6
0·022	C280AE/P22K	12·5	9	4	0·6
0·033	C280AE/P33K	12·5	9	4	0·6
0·047	C280AE/P47K	12·5	9	4	0·6
0·068	C280AE/P68K	12·5	10	5	0·6
0·10	C280AE/P100K	12·5	11	6	0·6
0·15	C280AE/P150K	17·5	11	6	0·8
0·22	C280AE/P220K	17·5	12	7	0·8
0·33	C280AE/A330K	22·5	11·5	6·5	0·8
0·47	C280AE/A470K	22·5	12·5	7·5	0·8
0·68	C280AE/A680K	22·5	14·5	9·5	0·8
1·0	C280AE/AIM	30·0	14·5	9·5	0·8
1·5	C280AE/AIM5	30·0	18	10·5	0·8
2·2	C280AE/A2M2	30·0	20·5	12·5	0·8

400 V Version

Capacitance (μF)	Type Number	Max. body dimensions (mm)			
		B	H	D	d
0·010	C280CF/P10K	12·5	9	4	0·6
0·015	C280CF/P15K	12·5	9	4	0·6
0·022	C280CF/P22K	12·5	9	4	0·6
0·033	C280CF/P33K	12·5	10	5	0·6
0·047	C280CF/P47K	12·5	11	6	0·6
0·068	C280CF/P68K	17·5	11	6	0·8
0·10	C280CF/P100K	17·5	12	7	0·8
0·15	C280CF/P150K	22·5	11·5	6·5	0·8
0·22	C280CF/P220K	22·5	12·5	7·5	0·8
0·33	C280CF/A330K	22·5	14·5	9·5	0·8
0·47	C280CF/A470K	30	14·5	9·5	0·8
0·68	C280CF/A680K	30	18	10	0·8
1·0	C280CF/AIM	30	20	12	0·8

VOLTAGE DEPENDENT RESISTORS

VDRs have a resistance value varying with the applied voltage and are designed for applications in television receivers and other equipment.

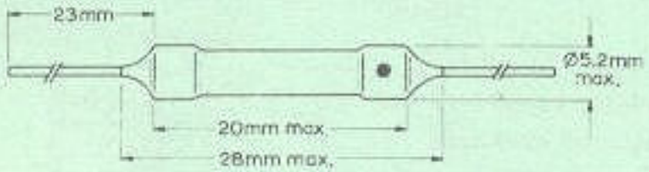
ROD-TYPE (AXIAL LEADS)

MAXIMUM DISSIPATION (Tamb = 40 °C): 700 mW.
Typical applications:

The types E298ED/A258, E298ED/A260, E298ED/A265 and E298ED/P268 are suitable for damping the primaries of frame output transformers to prevent ringing and flashover. The types E298ZZ/06 and E298ED/A265 can be used as rectifiers for asymmetric pulses (e.g. to provide a negative voltage rail for a.g.c.).

The type E298ZZ/06 can also be used to stabilise the line timebase output stage without the use of a triode in the stabilising circuit.

The axial-lead types are lacquer-coated and the leads are 0·8 mm (21 s.w.g. approx.) tinned copper.



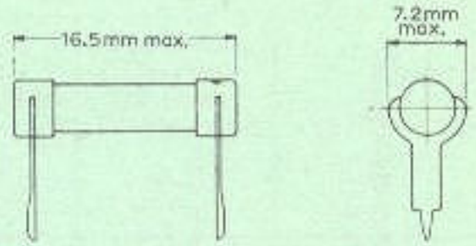
Type Number	Reference Voltage for a current of		Reference Voltage tolerance	Colour Dot
	V	mA	%	
E298ED/A258	470	10	10	Green
E298ED/A260	560	10	10	Blue
E298ED/A262	680	10	10	Violet
E298ED/A265	910	10	10	White
E298ED/P268	1200	10	20	Grey
E298ZZ/06	950	2·0	10	Black and Blue

ROD-TYPE (TAG-ENDED)

MAXIMUM DISSIPATION (Tamb = 40 °C): 700 mW.
Typical applications:

E298CD/A258 as for E298ED/A258;
E298ZZ/05 as for E298ZZ/06 (see above).

The tag-ended types are not lacquer-coated; they may be mounted in two holes in a printed wiring board 12·7 mm apart, each 1mm diameter.



Type Number	Reference Voltage for a current of		Reference Voltage tolerance	Colour Dot
	V	mA	%	
E298CD/A258	470	10	10	Green
E298ZZ/05	950	2·0	10	Brown

PLAIN ROD TYPE

These voltage dependent resistors are intended for focus tracking in line timebase circuits of colour television receivers. They are cylindrical rods, unlacquered and uninsulated, with tinned ends.

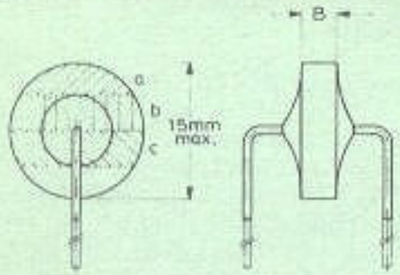
Type Number	Average Current for a voltage of (kV)	(μA)	Max. Current (μA)	Dimensions (mm)	
				Max. dia.	Max. body length
E298ZZ/103	7	125	175	7·7	71
	3	60			
E298ZZ/104	25	75	150	7·7	205
	10	4·0			

(Electrical parameters apply at an ambient temperature of 50 ± 2 °C.)

DISC TYPE

MAXIMUM DISSIPATION (Tamb = 40 °C): 800 mW.

The resistors are lacquer-coated. The tinned copper connecting leads have a diameter of 0·8 mm (21 s.w.g. approx.) and a length of 50 mm.



Type Number	Reference Voltage for a current of		Dimension B max. mm	Colour Coding		
	V (±20%)	mA		a	b	c
E299DD/P116	8	100	5·0	brown	brown	blue
E299DD/P118	10	100	5·0	brown	brown	grey
E299DD/P120	12	100	5·0	brown	red	black
E299DD/P216	8	10	5·0	red	brown	blue
E299DD/P218	10	10	5·0	red	brown	grey
E299DD/P220	12	10	5·0	red	red	black
E299DD/P222	15	10	5·0	red	red	red
E299DD/P224	18	10	5·0	red	red	yellow
E299DD/P226	22	10	5·0	red	red	blue
E299DD/P228	27	10	5·0	red	red	grey
E299DD/P230	33	10	5·0	red	orange	black
E299DD/P232	39	10	5·0	red	orange	red
E299DD/P234	47	10	5·0	red	orange	yellow
E299DD/P236	56	10	5·0	red	orange	blue
E299DD/P238	68	10	5·0	red	orange	grey
E299DD/P336	56	1	5·0	orange	orange	blue
E299DD/P338	68	1	5·0	orange	orange	grey
E299DD/P340	82	1	5·0	orange	yellow	black
E299DD/P342	100	1	5·5	orange	yellow	red
E299DD/P344	120	1	6·0	orange	yellow	yellow
E299DD/P346	150	1	6·5	orange	yellow	blue
E299DD/P348	180	1	7·0	orange	yellow	grey
E299DD/P350	220	1	7·5	orange	green	black
E299DD/P352	270	1	8·0	orange	green	red
E299DD/P354	330	1	9·0	orange	green	yellow

VARITE N.T.C. THERMISTORS

Thermally sensitive semiconductors possessing a large negative temperature coefficient of resistance.

Applications:

Type VA1015 and VA1026 are intended as surge limiters for use with 300 mA series heater chains. The others are intended for general purpose temperature compensation in transistor circuits.

Type Number	Max. Dissipation W	Operating Current at max. Dissipation	Resistance (Ω)			B factor* °K
			25 °C	55 °C	100 °C	
VA1015	6·0	450 mA	930	400	100	3600
VA1026	2·5	300 mA	400	130	37	3700
VA1033	1·0	2·0 A	4·0	1·5	0·5	2800
VA1034	1·0	800 mA	50	18	5·0	3300
VA1038	1·0	380 mA	1300	225	30	5450
VA1039	1·0	430 mA	500	105	14	5200
VA1040	1·0	620 mA	130	32	6·0	4400
VA1053	1·0	1·1 A	8·0	3·5	1·1	2900
VA1055S	0·6	33 mA	15 000	4200	1200	3550
VA1056S	0·6	23 mA	47 000	14 000	3300	3925
VA1066S	0·6	55 mA	4700	1600	500	3250
VA1067S	0·6	15 mA	150 000	40 000	9000	4075
VA1074	1·0	1·5 A	6·0	2·8	0·9	2800
VA1077	1·0	1·2 A	33·5	8·0	1·5	4200
VA1086	1·0	1·85 A	2·2	1·0	0·4	2650
VA1091	1·5	27 mA	150 000	40 000	7500	4150
VA1096	0·6	230 mA	150	60	16	3075
VA1098	0·6	85 mA	1500	400	80	3475
VA1099	1·0	1·3 A	6·0	2·8	0·9	2800
VA1100	1·0	1·2 A	15	5·2	1·6	3000

*The B factor is used to determine the resistance at any temperature from the formula:

$$\log_{10}R_1 = \log_{10}R_2 + \frac{B}{2.303}\,\frac{T_2 - T_1}{T_2 T_1}$$

where R_1 is the resistance at a temperature of T_1 (°K) and R_2 is the resistance at a temperature of T_2 (°K).

DIODE PROTECTION THERMISTOR VA1104

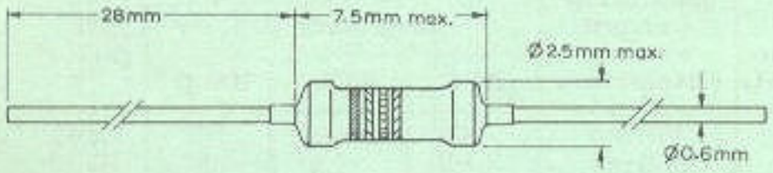
Type VA1104 is intended for diode protection in power supplies for colour television receivers.

Resistance at Tamb = 25 °C	≥15	Ω
Resistance at IRMS = 2·2 A	≤1	Ω
Max. current (RMS)	2·2	A
Max. repetitive peak voltage	380	V
B^{25}_{85} — factor*	3350	°K

*The value of B specified between temperature limits of 25 °C and 85 °C.

CARBON FILM RESISTORS
CR25 Series

Maximum power dissipation at 70°C: 0·33 W
Resistance ranges:
1 Ω to 1 MΩ (tolerance ±5%)
1·2 MΩ to 10 MΩ (tolerance ±10%)
*Preferred value series E12 (both ranges):
Limiting voltage. 250 VRMS



*Standard Values in a Decade for E12 Series:

10	22	47
12	27	56
15	33	68
18	39	82

1965/66 Valves, Tubes and Semiconductors Equivalents List

(*Reprinted by popular request*)

Before carrying out any substitution it is important that the manufacturer's technical data is studied to ensure that the types are compatible in all relevant respects and that any special limitations are not violated. Only those types which have been previously listed by other manufacturers as equivalents appear in the 'Other Equivalents' column. No guarantee that these types are still available is implied.

Mullard accept no responsibility for the accuracy of this list nor any liability for loss or damage arising from its use.

Please note that if a Mullard equivalent is given for another manufacturer's valve it does not imply that the reverse process will operate satisfactorily in all cases.

REFERENCES

† Valves having a different heater current, and therefore not direct replacements in a.d./d.c. receivers.

Where necessary the name of the manufacturer is indicated in bracketed italics immediately following the valve type number.

Examples: AC/DD(*TH-AEI*), DD6(*C*), PT4(*F*).

C	Cossor	*H*	Hivac
EK	Ekco	*M*	Mullard
TH-AEI	Thorn-AEI	*MO*	Marconi Osram
F	Ferranti	*T*	Tungsram

Type	Mullard Direct Equivalent	Other Equivalents
A11B	IW4–350	R2, R42, 1867
A11C	IW4–500	MU14, R3, UU5, 44IU
A11D	IW4–300	BVA211, MU12, UU4
A20B	—	DDL4
A23A	—	AC/HL/DD, DDT
A27D	PEN4DD	—
A30D	—	AC/HL, 41MHL
A36A	—	41STH
A36B	—	41STH
A36C	—	4THA
A40M	—	—
A47–11W	A47–11W	—
A47–13W	A47–13W	CME1906
A47–14W	A47–14W	CME1908
A47–18W	A47–18W	—
A50A	—	MS/PEN, SPT4A
A50B	—	MS/PENB
A50M	—	MVS/PEN, VPT4
A50N	—	MVS/PEN
A50P	VP4B	AC/VP2, VP41
A59–11W	A59–11W	A59–12W
A59–12W	A59–11W	CME2305
A59–13W	A59–16W	CME2306
A59–15W	A59–15W	CME2308
A59–16W	A59–16W	—
A61	—	U193, U349
A70B	—	MP/PEN, 7A2
A70C	PENA4	PT4(*F*), 7A3, 42MP/PEN
A70D	PENA4	AC2PEN, PT4(*F*), 42MP/PEN
A70E	—	—
A80A	FC4	VHT4, 15A2, 41MPG
A430N	—	—
AA119	AA119	—
AA129	AA129	—
AB1	—	—
AB2	—	—
ABC1	—	—
ABL1	—	—
AC/DD(*TH-AEI*)	—	—
AC/DD(*H*)	—	—
AC/DDT	—	MHD4
AC/HL	—	MH4, 41MHL
AC/HL/DD	—	DDT, MHD4
AC/HP (5-pin)	—	—
AC/HP (7-pin)	—	SPT4A

Type	Mullard Direct Equivalent	Other Equivalents
ACO42	—	2P
ACO44	—	LP4, PP3/250, PX4, 4XP
ACO54	—	—
ACO64	—	—
ACO84	—	—
ACO84N	—	—
AC/P	—	—
AC/PEN	—	MKT4, MP/PEN, 7A2
AC/Q	—	—
AC/Qa	—	—
AC/SG	—	—
AC/SGVM	—	—
AC/SH	—	MS4B
AC/SL	—	SPT4A
AC/S1VM	—	VPT4
AC/S2	—	MS4B, SPT4A
AC/S2PEN	—	MS/PEN
AC/TH1	—	X41
AC/TH1A	—	TH41
AC/TP	—	—
AC/VH	—	—
AC/VP	—	—
AC/VPB	VP4B	VP41
AC/VP1	—	MVS/PEN
AC/VP2	VP4B	S420
AC/VS	—	—
AC/Y	—	—
AC/Z	PENA4	PT4(*F*)
AC/ZDD	—	PT4D
AC2HL	—	—
AC2PEN	PENA4	KT41, PT4(*F*), 7A3, 42MP/PEN
AC2PENDD	—	PTD4
AC4PEN	—	—
AC5PEN	—	PT10
AC5PENDD	—	—
AC104	—	—
AC107	AC107	—
AC126	AC126	—
AC127	AC127	—
AC128	AC128	—
AD140	AD140	—
AF2	—	—
AF7	—	—
AF102	AF102	—
AF114	AF114	—

Type	Mullard Direct Equivalent	Other Equivalents
AF115	AF115	—
AF116	AF116	—
AF117	AF117	—
AF118	AF118	—
AF124	AF124	—
AF125	AF125	—
AF126	AF126	—
AF127	AF127	—
AF178	AF178	—
AF179	AF179	—
AF180	AF180	—
AF181	AF181	—
AF186	AF186	—
AK2	—	—
AL4	—	—
AL5	—	—
AL60	—	—
APP4A	—	MKT4
APP4As	—	—
APP4B	PENA4	AC2PEN, KT41, PT4(*F*)
APP4Bs	—	—
APP4E	—	—
APV4	IW4–350	MU12, R42, 1867
AS4120	—	MS4B, SPT4A
AS4125	—	—
AU101	AU101	—
AU103	AU103	—
AW21–11	AW21–11	—
AW36–20	AW36–20	14ABP4A, C14PM
AW36–21	AW36–20	14ABP4A
AW38–80	AW36–80	14AHPAA
AW43–80	AW43–80	C17/5A, 17BTP4
AW43–88	AW43–88	C17AA, 17CVP4, CME1706
AW43–89	AW43–89	—
AW47–10	—	—
AW47–90	AW47–90	C19AK, C19/7A, CME1902
AW47–91	AW47–91	CME1903
AW53–80	AW53–80	21CLP4
AW53–88	AW53–88	C21AA, C21/7A, CME2103
AW53–89	AW53–89	—
AW59–10	—	—
AW59–90	AW59–90	C23AK, CME2302
AW59–91	AW59–91	CME2303
AW59–95	—	CME2301, 7701A
AX50	—	—

Type	Mullard Direct Equivalent	Other Equivalents
AZ1	AZ1	—
AZ2	—	—
AZ3	—	—
AZ32	—	—
AZ41	AZ41	—
AZ50	—	—
BA114	BA114	—
BA115	BA115	—
B36	12SN7GT	—
B65	6SN7GT	—
B152	ECC81	B309, 12AT7
B228	—	—
BF109	BF109	—
BVA211, BVA214	DW4–350 or IW4–350	R4
BVA215, BVA216	DW4–350 or IW4–350	R4
BVA243, BVA246, BVA247	EF39	6K7G†
BVA264, BVA265	EL33	6AG6G
BVA266, BVA267	EL33	—
BVA274	ECH35	6K8G†, X147
BVA275, BVA276	ECH35	6K8G†, X147
BY100	BY100	—
BY114	BY114	—
BY118	BY118	—
BYX10	BYX10	—
C9A	—	—
C9B	—	—
C10B	UR1C	CY1C
C12/1	MW31–74	C12FM, 12XP4, 121K
C12A	—	CRM121B, CRM123
C12B	—	—
C12D	—	—
C12FM	MW31–74	12XP4, 121K
C14/3A	AW36–20	14ABP4A
C14BM	—	—
C14FM	—	—
C14HM	—	—
C14JM	—	—
C14PM	—	—

Type	Mullard Direct Equivalent	Other Equivalents
C17/1	MW43–69	17BQP4, 173K
C17/1A	MW43–69	17BQP4, 173K
C17/2	—	—
C17/4A	MW43–80	—
C17/5A	AW43–80	17BTP4
C17/7A	AW43–88	C17AA, 17CVP4, CME1706
C17AA	AW43–88	17CVP4, CME1706
C17AF	—	—
C17BM	—	—
C17FM	—	—
C17HM	—	—
C17JM	—	—
C17LM	—	—
C17PM	—	—
C19/7A	AW47–90	C19AK, CME1902
C19/10A	AW47–91	CME1903
C19/10AP	A47–13W	CME1906
C19AH	—	—
C19AK	AW47–90	CME1902
C20C	—	—
C21/1A	—	—
C21/7A	AW53–88	C21AA
C21AA	AW53–88	C21/7A
C21AF	—	—
C21HM	—	—
C21KM	MW53–80	—
C21NM	MW53–20	21CJP4
C21SM	—	—
C21TM	—	CRM212, 7502A
C23/7A	AW59–90	C23AK, CME2302
C23/10A	AW59–91	CME2303
C23AG	—	—
C23AK	AW59–90	C23/7A, CME2302
C23B	—	—
C27D	—	—
C30B	—	4D1
C36–24	MW36–24	—
C36A	—	TH2321, 202STH
C36C	—	TH2321, 302THA
C50B	—	8D2
C50N	—	VP1322, 9D2, 13VPA
C70D	—	7D6
C80B	—	—
CB1	—	—
CB2	—	—

Type	Mullard Direct Equivalent	Other Equivalents
CBC1	—	—
CBL1	—	—
CBL31	—	—
CC2	—	—
CCH35	CCH35	—
CF1	—	—
CF2	—	—
CF7	—	—
CG1–E	—	GD4, GD5
CG3–E	—	—
CG4–E	—	GD5
CG6–E	—	GD4
CG10–E	—	—
CG12–E	—	GD3
CK1	—	—
CL4	—	—
CL6	—	—
CL33	CL33	332PEN
CME141	—	—
CME1402	—	7205A
CME1702	—	—
CME1703	—	7405A
CME1705	—	7604A
CME1706	AW43–88	C17/7A, C17AA, 17CVP4
CME1901	—	7601A
CME1902	AW47–90	C19/7A, C19AK
CME1903	AW47–91	—
CME1906	A47–13W	C19/10AP
CME1908	A47–14W	A47–14W
CME2101	—	7503A
CME2104	—	—
CME2301	—	AW59–95, 7701A
CME2302	AW59–90	C23/7A, C23AK
CME2303	AW59–91	C23/10A
CME2305	A59–11W	A59–12W
CME2306	A59–16W	A59–13W
CME2309	A59–15W	A59–15W
CRM71	—	—
CRM91	—	—
CRM92	—	C9A
CRM92A	—	92A
CRM93	—	—
CRM121	—	C12A
CRM121A	—	C12A
CRM121B	—	—

Type	Mullard Direct Equivalent	Other Equivalents
CRM122	—	—
CRM123	—	—
CRM124	—	—
CRM141	—	—
CRM142	—	—
CRM143	—	—
CRM144	—	7204A
CRM151	—	—
CRM152	—	—
CRM152A	—	—
CRM152B	—	—
CRM153	—	—
CRM171	—	—
CRM172	—	7404A
CRM173	—	—
CRM211	—	—
CRM212	—	C21TM, 7502A
CY1	—	—
CY1C	UR1C	V20
CY2	—	—
CY31	—	U201, OM1
CY32	—	—
D1	—	—
D4	—	AC/HL, MH4, 41MHL
D41	—	DDL4
D42	—	—
D43	—	—
D63	EB34†	6H6G/GT
D152	EB91	DD6(*C* or *F*), D77, 6AL5, 6D2, EAA91
D400	—	—
D1300	—	—
DA	—	4D1
DA30	—	—
DA40	—	—
DA41	—	—
DA90	DA90	1D13, 1A3
DAC1	—	—
DAC32(C1)	1H5G / DAC32(C1)	HD14
DAC32 (Met)	—	1H5GT
DAF91	DAF91	ZD17, 1FD9, 1S5
DC90	—	—
DCC90	DCC90	—
DD4	—	DDL4
DD4s	—	—

Type	Mullard Direct Equivalent	Other Equivalents
DD6(*C* or *F*)	EB91	D77, D152, EAA91, 6AL5, 6D2
DD6 / DD6ds	—	—
DD6G	EB91	D77, D152, EAA91, 6AL5, 6D2
DD13	—	—
DD13s	—	—
DD41	—	—
DD465	—	—
DD620	—	—
DDA1	—	—
DDL4	—	—
DDPP4B	—	AC2PENDD, DN41, PT4D
DDPP4Bs	—	—
DDPP4M	PEN4DD	—
DDPP6B	—	—
DDPP6Bs	—	—
DDPP39	—	—
DDPP39M	—	—
DDPP39s	—	—
DDT	—	AC/HL/DD, MHD4, H4D
DDT2	—	H2D
DDT4	—	AC/HL/DD, MHD4
DDT4s	—	—
DDT6s	—	—
DDT13	—	—
DDT13s	—	—
DDT215	—	—
DDT220	—	H2D
DF1	—	—
DF33	DF33	1N5GT
DF64	DF64	—
DF66	DF66	—
DF70	—	—
DF91	DF91	W17, 1F3, 1T4
DF92	DF92	1F2, 1L4
DF97	DF97	1AN5
DH42	—	AC/HL/DD
DH63	6Q7G	—
DH63 (Met)	6Q7GT	—
DH76	—	—
DH77	EBC90	6AT6
DH81	—	7B6
DH101	—	—
DH107	—	—
DH147	EBC33	OM4

Type	Mullard Direct Equivalent	Other Equivalents
DH149	—	7C6
DK1	—	—
DK32	DK32	1A7GT
DK40	DK40	—
DK91	DK91	X17, 1C1, 1R5
DK92	DK92	X18, 1AC6, 1C2
DL2	—	—
DL33	DL33 / 3Q5GT	N16
DL35	DL35	N14
DL35	1C5G	N14
DL63	EBC33†	6R7G
DL64	DL64	—
DL66	—	—
DL68	DL68	—
DL71	—	—
DL72	—	—
DL74M	—	—
DL82	—	—
DL91	—	1S4
DL92	DL92	N17, 1P10, 3S4
DL93	DL93	—
DL94	DL94	N19, 1P11, 3V4
DL145	—	10LD11
DN41	—	AC2PENDD, PT4D
DN143	EBL21	—
DO24	—	PP5/400, PX25
DO26	—	—
DO30	—	DA30
DO42	PEN4DD	—
DP61	EF95	6AK5
DP495	PEN4DD	A27D
DP4480	—	—
DT3 / DT30	—	—
DT41	—	—
DT436	—	AC/HL/DD
DT1336	—	—
DTU1	—	—
DW2	—	506BU, 1821
DW3	DW4–350	R2, R4
DW4	DW4–500	R3, R43, U14, 1561
DW4–350	DW4–350	R4
DW4–500	DW4–500	U14, 1561
E235	—	—

Type	Mullard Direct Equivalent	Other Equivalents
E446	—	—
E447	—	—
EA50	EA50	SD61, 6D1(*TH-AEI*)
EAA91	EB91	DD6(*C* or *F*), D77, D152, 6AL5, 6D2
EAB1	—	—
EAC91	EAC91	—
EAF41	—	—
EB4	—	—
EB34	EB34	D63†
EB91	EB91	DD6(*C* or *F*), D77, D152, 6AL5, 6D2, EAA91
EBC3	—	—
EBC33	EBC33	DH63†, DH147, OM4
EBC90	EBC90	DH77, 6AT6
EBC91	EBC91	6AV6
EBF2	—	—
EBF32	—	—
EBL1	—	—
EBL21	EBL21	DN143
EBL31	—	—
EC31	—	—
EC50	—	—
EC52	—	—
EC53	—	—
EC54	—	—
EC90	EC90	6C4
EC91	EC91	6L34
EC92	EC92	—
ECC31	—	—
ECC34	ECC34	—
ECC35	ECC35	6SL7GT
ECC40	ECC40	—
ECC91	ECC91	6J6
ECF804	—	—
ECH2	—	—
ECH3	ECH3	—
ECH4	—	—
ECH21	ECH21	X143
ECH33	CCH35 (a.c./d.c.) / ECH35 (a.c.)	—
ECH35	ECH35	OM10, X61M, X147
ECH41	—	—
EE50	—	—
EF2	—	—
EF5	EF9	—
EF6	—	—

Type	Mullard Direct Equivalent	Other Equivalents
EF8	EF9	—
EF9	EF9	—
EF22	EF22	W143
EF38	EF39	—
EF39	EF39	OM6, W147
EF42	EF42	Z150
EF50	EF50	63SPT
EF54	EF54	—
EF55	EF55	—
EF93	EF93	W727, 6BA6
EF94	EF94	6AU6
EF97	EF97	6ES6
EF98	EF98	6ET6
EFM1	—	—
EH2	—	—
EK2	—	—
EK3	—	—
EK32	—	—
EK90	EK90	X77, X727, 6BE6
EL2	—	—
EL3	—	—
EL3N	—	—
EL5 }	—	—
EL6 }	—	—
EL31	—	—
EL32	EL32	—
EL33	EL33	6AG6G
EL35	—	—
EL37	EL37	KT66
EL38	EL38	6CN6
EL38M	EL38	6CN6
EL50	—	—
EL83	EL83	6CK6
EL90	EL90	N727, 6AQ5
EL820	EL820	—
EL822	—	—
EM1	—	—
EM3	—	—
EM4	—	—
EM71	—	—
EM80	—	6BR5, 65ME
EM85	—	—
EN31	EN31	—
EW53	—	—
EW58	—	—

Type	Mullard Direct Equivalent	Other Equivalents
EW59	—	—
EY81	EY81	6R3
EY83	—	—
EY91	EY91	—
EZ1	—	—
EZ2	—	—
EZ3	—	—
EZ90	EZ90	U78, 6X4
FC2	—	X22, 210PG
FC2A	—	VHT2A
FC4	FC4	MX40, VHT4, 15A2, 41MPG
FC13	—	—
FC13C	—	—
FC141	—	—
FST2/8	BY100	—
FW4–500	FW4–500	U18/20, 45IU
FW4–800	FW4–800	U18/20
FY	—	—
G431	—	1821
G470	—	1821
G2080 (P base)	—	—
G2080 (5-pin)	UR1C	CY1C
G4120	DW4–500	1561
G4120N	IW4–500	UU5, 431U, 1861
GD3	—	—
GD4	—	—
GD5	—	—
GDT4B	—	—
GDT4C	—	—
GJ3D	—	—
GJ5D	—	—
GN24	—	1821
GZ30	GZ30 / 5Z4GT	R52, 5Z4GT
GZ33	GZ33	—
GZ37	GZ37	53KU, U54
H2	—	—
H2D	—	210DDT
H4D	—	AC/HL/DD, DDT
H63	—	6F5G
H141D	—	—
H210	—	—
HAD	—	11D3
HBC90	HBC90	12AT6
HBC91	HBC91	12AV6

Type	Mullard Direct Equivalent	Other Equivalents
HD14	1H5G / DAC32(C1)	—
HD22	—	H2D
HD23	—	H2D
HD24	—	H2D, 210DDT
HF93	HF93	12BA6
HG1006	—	—
HK90	HK90	12BE6
HL2	—	210HF
HL2K	—	—
HL4+	—	AC/HL
HL4G	—	MH4
HL4Gs	—	—
HL13(*H*)	—	—
HL13(*M*)	—	—
HL13(*T*)	—	—
HL13C	—	4D1
HL13s	—	—
HL21DD	—	H2D, 210DDT
HL22	—	—
HL23	—	—
HL23DD	—	—
HL41	—	—
HL41DD	—	—
HL42DD	—	—
HL92	HL92	50C5
HL133	—	—
HL133DD	—	—
HL210	—	—
HL1320	—	4D1
HL/DD1320	—	11D3
HLA2	—	AC2HL, 41MHL
HLB1	—	210HF
HN309	—	—
HP2	—	—
HP13	—	—
HP13s	—	—
HP210nc (4-pin)	—	SPT2, Z21
HP210nc (7-pin)	—	—
HP215(*H*)	—	Z21
HP4101c	—	SPT4A
HP4105	—	VPT4 (5-pin)
HP4106	—	—
HP4106c	—	VPT4 (5-pin)
HP4115c	—	—

Type	Mullard Direct Equivalent	Other Equivalents
HR1	—	—
HR2	—	—
HR210	—	—
HS1004	—	—
HVR1	—	—
HVR2	—	—
HVR2A	—	—
HY90	HY90	35W4
IW2	—	1881
IW2A	IW4–350	—
IW3	IW4–350	R2, R42, 1867
IW4	IW4–500	UU5, R42
IW4–350	IW4–350	R2, R42, 1867
IW4–500	IW4–500	MU14, R3, R43, UU5, 43IU
K23A	—	—
K23B	—	H2D, 210DDT
K30A	—	—
K30B	—	210LF
K30C	—	210HF
K30D	—	—
K30G	—	L2(*F*), 220PA
K30K	—	—
K33A	—	—
K40B	—	—
K40N	—	VS2
K50M	—	210VPT
K50N	—	—
K70B	—	PEN220, PT2, 220OT
K70D	—	—
K77B	—	—
K80A	—	210PG, VHT2A
K80B	—	—
K435–10	—	LP4
KBC32	—	—
KCF30	—	—
KF35	—	—
KK2	—	—
KK32	—	—
KL4	—	—
KL35	—	—
KLL32	—	—
KT2	—	PT2, 220OT
KT24	—	PT2
KT32	25L6GT	—
KT33C	—	—

Type	Mullard Direct Equivalent	Other Equivalents
KT36	—	—
KT41	—	AC2PEN, 7A3, 42MP/PEN
KT42	—	AC/PEN, 7A2
KT44	—	—
KT45	—	—
KT55	—	—
KT61	—	6AG6G, 6P25
KT63	6F6G	—
KT66	EL37	6L6G
KT71	—	—
KT76	—	—
KT81	—	—
KT88	—	—
KT101	—	—
KTW61	—	—
KTW61M	—	—
KTW63	—	—
KTW74M	—	—
KTZ41	—	—
KTZ63	—	—
L2(*TH-AEI*)	—	210LF
L2(*F*)	—	210LF
L2/B	—	—
L2/DD	—	—
L4	—	AC/P
L21	—	210LF
L21/DD	—	H2D
L63	6J5G	—
L77	EC90	—
L210	—	—
LD210	—	—
LL2	—	—
LL2s	—	—
LL4	—	—
LN309	PCL83	—
LP2(*MO*)	—	220PA
LP2(*F*)	—	—
LP4	—	PP3/250, PX4, 4XP
LP220	—	L2(*F*)
LZ329	PCF80	30C1, LZ319, 8A8, 9A8
LZ339	30C15/PCF800	9EN7, 30C15, PCF800
ME41	—	—
ME91	—	—
MH4	—	AC/HL, 41MHL
MH41	—	AC2HL

Type	Mullard Direct Equivalent	Other Equivalents
MH4105	—	MX40
MHD4	—	AC/HL/DD, DDT, H4D
MHL4	—	AC/HL
MKT4	—	MP/PEN, 7A2
ML4	—	—
MM4V	—	—
MP4106C	—	VPT4
MP/PEN	—	MKT4, 7A2
MPT4	—	MP/PEN, 7A2
MS4B	—	SPT4A
MS4C	—	SPT4A
MSG/HA	—	MS4B, SPT4A
MSG/LA	—	MS4B, SPT4A
MSP4	—	MS/PEN
MSP41	—	—
MS/PEN	—	—
MS/PENA	—	SPT4A
MS/PENB	—	—
MU12	IW4–350	R2, R42, UU5, 1867
MU12/14	IW4–500	—
MU14	IW4–500	R3, UU5, 43IU
MV/SG	—	—
MVS/PEN	—	—
MW6–2	MW6–2	—
MW22–7	—	—
MW22–14	—	—
MW22–14C	—	—
MW22–16	MW22–16	—
MW22–17	—	—
MW22–18	—	—
MW31–7	—	—
MW31–14	—	—
MW31–14C	—	—
MW31–16	MW31–74	C12FM, 121K
MW31–17	—	—
MW31–18	—	—
MW31–20	—	—
MW31–21	—	—
MW31–22	—	—
MW31–23	—	—
MW31–74	MW31–74	12XP4A
MW36–22	MW36–24	—
MW36–24	MW36–24	C36–24, 14KP4A, 14LP4, 141K
MW36–44	MW36–44	—
MW41–1	MW41–1	—

Type	Mullard Direct Equivalent	Other Equivalents
MW43–43	MW43–43	—
MW43–64	MW43–69	17BQP4, 172K
MW43–69	MW43–69	17BQP4, 173K
MW43–80	MW43–80	C17–40
MW53–20	MW53–20	21CJP4
MW53–80	MW53–80	C21KM, 212K
MX40	—	15A2, 41MPG
N14	DL35 / 1C5G	—
N15	—	—
N16	DL33	—
N16	3Q5GT	—
N17	DL92	1P10, 3S4
N18	—	3Q4
N19	DL94	1P11, 3V4
N30	—	7D5
N37	—	—
N40	—	7A2
N41	PENA4	AC2PEN, PT4(*F*), 7A3, 42MP/PEN
N63	—	—
N66	EL37	—
N78	—	—
N108	—	—
N118	—	10P13
N145	—	10P13
N147	EL33	6AG6G
N148	—	7C5
N153	PL83	N309, 15A6
N154	PL82	N329, 16A5, 30P16
N308	—	30P4
N339	—	—
N349	—	—
N359	PL81	N152, 21A6
N727	EL90	6AQ5
O202	—	—
O406	FC4	VHT4
O1307 (P base)	—	—
O1307 (7-pin)	—	—
OA47	—	—
OA60	OA70	GD3
OA61	OA81	GD5
OA70	OA70	—
OA71	OA81	—
OA79	OA79	—
OA81	OA81	—

Type	Mullard Direct Equivalent	Other Equivalents
OA90	OA90	—
OA91	OA91	—
OA202	OA202	—
OA210	OA210	—
OAZ210	OAZ210	—
OC16W	OC16W	—
OC19	OC19	—
OC26	OC26	—
OC44	OC44	—
OC44M	OC44M	—
OC45	OC45	—
OC45M	OC45M	—
OC57	OC57	—
OC58	OC58	—
OC59	OC59	—
OC60	OC60	—
OC65	OC65	—
OC66	OC66	—
OC70	OC70	—
OC71	OC71	—
OC72	OC72	—
OC74	OC74	—
OC75	OC75	—
OC78	OC78	—
OC78D	OC78D	—
OC81	OC81	—
OC81D	OC81D	—
OC81DM	OC81DM	—
OC82	OC82	—
OC82D	OC82D	—
OC170	OC170	—
OC171	OC171	—
OM1	CY31	U201
OM3	EB34	—
OM4	EBC33	DH147
OM5	EF37A	OM5B
OM5A	EF37A	OM5B
OM5B	EF37A	—
OM6	EF39	W147
OM7	EF39	—
OM9	EL32	—
OM10	CCH35 (a.c./d.c.) / ECH35 (a.c.)	X147
OP41	—	—
OP42	PENA4	AC2PEN, PT4(*F*)

Type	Mullard Direct Equivalent	Other Equivalents
ORP12	ORP12	—
ORP60	ORP60	—
P2	—	—
P12–250	—	LP4, PP3/250, PX4
P27–500	—	PP5/400, PX25
P41	—	—
P61	—	—
P220(*T*)	—	—
P220(*TH-AEI* or *H*)	—	L2(*F*), 220PA
P220A	—	—
P225 (5-pin)	—	PT2
P240	—	—
P435	—	—
P440N	—	—
P441N	—	—
P495	PENA4	PT4(*F*)
PA1	—	41MXP
PA20	—	2P
PB1	—	L2(*F*), 220PA
PC95	PC95	—
PCC806	—	30L17
PCE82	—	30FL12
PD220	—	—
PEN4DD	PEN4DD	—
PEN4V	—	—
PEN4VA	—	MKT4, MP/PEN, 7A2
PEN4VB	PENA4	KT41, PT4(*F*), 7A3
PEN24	—	—
PEN25	—	—
PEN26	—	—
PEN36C	—	7D6
PEN40DD	—	—
PEN44	—	—
PEN45	—	—
PEN45DD	—	—
PEN46	—	—
PEN220	—	KT2, PT2, 220OT
PEN230	—	—
PEN231	—	—
PEN383	—	—
PEN384	—	—
PEN428	—	—
PEN453DD	—	—
PEN650	—	—
PEN1340	—	7D8

Type	Mullard Direct Equivalent	Other Equivalents
PEN3520	—	7D6
PENA1	—	PT41
PENA4	PENA4	AC2PEN, KT41, PT4(*F*), 7A3, 42MP/PEN
PENB1	—	KT2, PT2, 220OT
PENB4	—	—
PENDD61	—	—
PENDD4020	—	—
PL33	PL33	—
PL38	PL38	—
PL38M	—	—
PM1A	—	—
PM1HF	—	210HF
PM1HL	—	—
PM1LF	—	—
PM2	—	220P
PM2A	—	L2(*F*)
PM2B	—	—
PM2BA	—	—
PM2DL	—	—
PM2DX	—	—
PM2HL	—	—
PM12, PM12A	—	Z21, 215SG
PM12M	—	VS2, W21
PM22	—	220PT
PM22A	—	KT2, PT2, 220OT
PM22D	—	—
PM24	—	—
PM24A	—	—
PM24B	—	—
PM24C	—	—
PM24M	—	PT41
PM84	—	—
PM202	—	—
PM252	—	—
PP2	—	PT2
PP2s	—	—
PP3–250	—	LP4, PX4, 4XF
PP4	—	—
PP4s	—	—
PP5–400	—	PX25
PP6As	—	—
PP6BG	EL33	6AG6G
PP6Bs	—	—
PP34	—	—

Type	Mullard Direct Equivalent	Other Equivalents
PP34s	—	—
PP35	—	—
PP36	—	—
PP220	—	—
PT2	—	KT2, 220OT
PT4(*F*)	PENA4	AC2PEN, 7A3, 42MP/PEN
PT4(*MO*)	—	PT41
PT4D	—	AC2PENDD
PT10	—	AC5PEN
PT25H	—	—
PT41	—	—
PT240	—	—
PTZ	—	—
PV4	DW4–350	R42
PV29s	—	—
PV30	—	—
PV30s	—	—
PV495	—	1821
PV4200	DW4–500	1561
PVB6s	—	—
PX4	—	LP4, PP3/250, 4XP
PX5	—	PX25
PX25	—	PP5/400
PX41	—	LP4, PX4
PX230	—	LP2, P2
PY31	PY31	—
PY32	PY32	PY33, U291
PY80	PY80	U152, 19X3
PY83	—	—
PY801	—	U193
PZ30	PZ30	—
QP21	—	240QP
QP22A	—	—
QP22B	—	240QP
QP25	—	—
QP230	—	240QP
QP240(*H*)	—	—
QP240(*TH-AEI*)	—	—
QPT2	—	240QP
R1	—	U10, UU5, 506BU
R2	IW4–350	MU14, R42, UU5, 1867
R3	IW4–500	MU14, UU5, 431U
R4	DW4–350	R2
R4A	DW4–500	R3, UU5, 1561
R10	—	HR2

Type	Mullard Direct Equivalent	Other Equivalents
R12A	EY51	6X2
R14	PZ30	—
R16	—	U37, 1T2
R19	—	—
R41	DW4–500	1561
R42	IW4–350	UU5,1867, 431U
R43	—	—
R52	GZ30 / 5Z4GT	—
RL7	EF54	—
RL16	—	—
RL18	—	—
RL37	EC54	—
RV120/350	DW4–350	R4, U14
RV120/350s	—	—
RV120/500	DW4–500	U14, UU5, 1561
RV120/500s	—	—
RV200/600	FW4–500 or FW4–800	U18/20
RZ	UR1C	CY1C
S4V	—	—
S4VA, S4VB	—	MS4B
S11A	—	506BU, 1821
S11D	DW4–350	R2, R4
S21	—	—
S22, S23	—	—
S24	—	—
S30C	—	LP4, PP3/250, 4XP
S30D	—	2P
S213	—	VS2, W21
S215, S215A, S215B	—	—
S215VM	—	VS2, W21
S218	—	Z22
S420	VP4B	AC/VP2
S434N	—	VPT4 (5-pin)
S435N	—	MSB4, SPT4A
S1324	—	—
S1328	—	—
SD2	—	—
SD4	—	—
SD6	—	—

Type	Mullard Direct Equivalent	Other Equivalents
SD61	EA50	6D1(*TH-AEI*)
SE14/70	—	C14PM
SE17/70	—	C17PM
SE211C	—	VS2
SG215	—	VS2, 215SG
SG215A	—	VS2, 215SG
SJ401B	—	—
SP2	—	SPT2, 210SPT
SP4(*M*)	—	MS/PEN, SPT4A
SP4(*T*)	—	—
SP4B	—	MS/PENB
SP4C	—	—
SP4s	—	—
SP6	EF91	Z77, 6AM6, 6F12, 8D3
SP6s	—	—
SP13(*M*)	—	—
SP13(*T*)	—	—
SP13B	—	—
SP13C	—	8D2, 13SPA
SP13s	—	—
SP22	—	—
SP41	—	—
SP42	—	—
SP61	—	—
SP181	—	—
SP210	—	210SPT
SP215	—	—
SP220	—	—
SP1320	—	—
SPT2	—	210SPT
SPT4A	—	MS/PEN
SS210	—	—
SU25	—	—
SU61	EY51	R12, U43, U151, 6X2
SU2150	—	—
SU2150A	—	—
SX13	—	—
SX634	—	—
T4D	—	D1
T6D	EA50	—
T9/2	—	T9/3
T9/3	—	—
T9/4	—	—
T9/5	—	—
T12/2	—	—

Type	Mullard Direct Equivalent	Other Equivalents
T12/44	—	—
T12/46	—	—
T12/54	—	—
T12/56	—	—
T12/71U	—	—
T12/72U	—	—
T12/81U	—	—
T12/82U	—	T12/72U
T12/91	—	—
T12/92	—	—
T12/100	—	—
T12/404	—	T12/44
T12/449	—	T12/44
T12/504	—	T12/549
T12/549	—	—
T41(*EK*)	—	—
T41(*TH-AEI*)	—	—
T900	—	—
T901	MW41–1	—
T901A	MW41–1	—
T908	—	—
T911	—	—
T914	—	—
TA10	—	—
TA10J	—	—
TA15	—	—
TA15/J	—	—
TDD2	—	—
TDD2A	—	HD24, H2D, 210DDT
TDD4	—	AC/HL/DD, DDT, MHD4
TDD13	—	—
TDD13C	—	—
TH2	—	X24, 220TH
TH4	—	X41, 41STH
TH4A	—	—
TH4B	—	4THA
TH13C	—	—
TH21C	—	TH2321, 202STH
TH22C	—	TH2321
TH29	—	TH2321
TH30	—	TH2321
TH30C	—	TH2321, 302THA
TH41	—	—
TH62	CCH35 (a.c./d.c.)	—
	ECH35 (a.c.)	—

Type	Mullard Direct Equivalent	Other Equivalents
TH233	—	—
TH2320	—	TH2321
TH2321	—	202STH
TJ1	—	—
TJ2	—	—
TJ3	—	—
TP1	—	—
TP2	—	—
TP22	—	—
TP23	—	—
TP25	—	—
TP2620	—	—
TR14/1	—	—
TR14/2	—	—
TR14/4	—	—
TR14/6	—	—
TR14/12	—	—
TR14/13	—	—
TR14/15	—	—
TR14/21	—	—
TR17/1	—	—
TR17/2	—	—
TR17/7	—	—
TR17/8	—	TR17/10
TR17/10	—	—
TR17/21	—	—
TR17/22	—	—
TR21/20	—	—
TR21/21	—	—
TSE4	—	—
TSP4	—	—
TT4	—	ML4
TT4A	—	—
TV4	—	—
TV4A	—	—
TV6	—	—
TX4	—	X41
TX21	—	TH2321
TX41	—	—
TY86F	TY86F	—
U10	—	UU5, 506BU
U12/13	DW4–350	R4
U14	DW4–500	R3, 1561
U16	—	—
U17	—	—

Type	Mullard Direct Equivalent	Other Equivalents
U18/20	FW4–500 or FW4–800	—
U19	—	—
U22	—	—
U24	—	—
U31	—	—
U33	—	—
U35	—	—
U37	—	R16, 1T2
U41	—	—
U45	—	—
U50	5Y3/GT	—
U52	5U4	—
U54	GZ37	53KU
U74	—	—
U76	—	—
U78	EZ90	6X4
U81	—	—
U82	—	7Y4
U84	—	—
U101	—	—
U107	—	—
U118	—	U404
U145	—	U404
U149	—	7Y4
U152	PY80	19X3
U154	PY82	U192, U319, 19Y3, 19SU
U193	—	A61, PY801, U349
U201	—	—
U251	—	U329
U281	—	—
U282	—	—
U291	PY32	PY33
U309	—	—
U329	—	U251
U349	—	A61, U193
U403	—	—
U404	—	U118, U145
U718	—	UU9
U801	—	—
U4020	—	40SUA
UAF41	—	—
UB41	UB41	—
UBL21	UBL21	—
UC92	UC92	—

Type	Mullard Direct Equivalent	Other Equivalents
UCC84	UCC84	—
UCF80	UCF80	—
UCH4	—	—
UCH21	UCH21	—
UCH41	—	—
UD2	—	—
UF42	UF42	Z142
UF80	UF80	—
UF85	UF85	—
UF86	UF86	—
UL44	UL44	—
UL46	UL46	—
UM4	UM4	—
UM34	—	—
UM80	UM80	Y119, 19BR5
UM84	—	—
UR1	—	—
UR1C	UR1C	CY1C
UR2	—	—
UR3	—	—
UR3C	—	—
UU2	—	R2, R41
UU3	IW4–350	MU14, R2, R42, 1867
UU4	IW4–350	MU14, R2, R42, 1867
UU5	IW4–500	MU14, R3, 43IU
UU6	—	—
UU7	—	—
UU8	—	—
UU9	—	66KU
UU10	—	—
UU60–250	IW4–350	R2, R42, 1867
UU120–350	IW4–350	MU14, R2, R42, 1867
UU120–350A	IW4–350	R42, 1867
UU120–500(*H*)	IW4–500	MU14, R3, R43
UU120–500 (*TH-AEI*)	DW4–500	1561
UY1N	UY1N	—
UY21	—	—
UY31	—	—
V6/R2	—	—
V6/R4M	—	—
V10/3A	—	—
V10/15	—	—
V10/30	—	—
V10/30A	—	—
V10/50	—	—

Type	Mullard Direct Equivalent	Other Equivalents
V10/50B	—	—
V20	UR1C	CY1C
V20s	—	—
V30	—	—
V312	—	41MTL
V503	—	—
V914	—	DDL4, D41
V1907	—	—
VFT6	—	6M1
VHT2	—	X22
VHT2A	—	210PG
VHT4	FC4	MX40, 15A2, 41MPG
VHTA	—	—
VM4V	—	—
VMP4	—	VPT4 (5-pin)
VMP4G	—	MVS/PEN (7-pin)
VMS4	—	—
VMS4B	—	—
VO2	—	X22
VO2s	—	—
VO4	FC4	MX40, VHT4
VO4s	—	—
VO6s	—	—
VO13	—	—
VO13s	—	—
VP2	—	W21, 210VPT
VP2B	—	—
VP4	—	MVS/PEN, VPT4
VP4A	—	MVS/PEN
VP4B	VP4B	AC/VP2, MVS/PENB
VP4C	—	—
VP6	EF92	W77, 6CQ6, 6F21, 9D6
VP12D	—	—
VP13	—	—
VP13A	—	—
VP13B	—	—
VP13C	—	VP1322, 9D2, 13VPA
VP21	—	—
VP22	—	—
VP23	—	—
VP41(*EK*)	VP4B	AC/VP2
VP41(*TH-AEI*)	—	—
VP133	—	—
VP210	—	W21, 210VPT
VP215	—	W21

Type	Mullard Direct Equivalent	Other Equivalents
VP1322	—	9D2, 13VPA
VPT2	—	210VPT
VPT4	—	MVS/PEN
VPT4B	—	—
VS2	—	W21
VS24	—	VS2
VS24K	—	VS2
VS210	—	VS2, W21
VS215	—	VS2, W21
VX2	—	—
VS2s	—	—
W17	DF91	1F3, 1T4
W21	—	210VPA
W42	—	AC/VP2, MVS/PENB
W61	—	—
W61M	—	—
W63	—	—
W76	—	—
W81	—	—
W101	—	—
W107	—	—
W118	—	10F9
W119	—	10F18
W143	EF22	—
W145	—	10F9
W147	EF39	OM6
W148	—	7H7
W149	—	7B7
W727	EF93	6BA6
W729	—	—
W739	—	6F18
WD150	EAF42	6CT7
WG4A	—	—
WG4B	—	—
WG5A	—	—
WG5B	—	—
WG6A	—	—
WG7A	—	—
WG7B	—	—
WG7C	—	—
WG7D	—	—
X14	—	—
X17	DK91	1C1, 1R5
X18	DK92	X20, 1AC6, 1C2
X20	DK92	1C2, X18, 1AC6

Type	Mullard Direct Equivalent	Other Equivalents
X21	—	VHT2A
X22	—	210PG
X24	—	220TH
X30	—	—
X31	—	—
X41	—	41STH
X42	—	15A2, 41MPG
X61M	ECH35†	OM10†
X63	6A8G	—
X64	—	6L7G
X65	—	—
X71M	—	—
X76M	—	—
X77	EK90	6BE6, X727
X78	—	—
X79	—	—
X81	—	7S7
X101	—	—
X109	—	—
X118	—	10C1
X143	ECH21	—
X145	—	10C1
X147	ECH35	OM10†
X148	—	7S7
X727	EK90	6BE6
XFT1	—	—
XFT2	—	—
Y61	—	6M1, 6U5G
Y62	—	—
Y63	—	6M1, 6U5G, 63ME
Y119	UM80	19BR5
Y220	—	KT2, PT2
Z14	1N5G	—
Z21 (4-pin)	—	SPT2
Z21 (7-pin)	—	210SPT
Z22	—	SPT2, 210SPT
Z63	—	—
Z66	—	—
Z90	EF50	63SPT
Z142	UF42	—
Z145	—	10F1
Z150	EF42	—
Z152	EF80	Z719, 6BX6, 64SPT
Z309	—	—
Z359	—	—

Type	Mullard Direct Equivalent	Other Equivalents
Z759	—	—
ZD17	DAF91	1FD9, 1S5
ZD152	EBF80	6N8, WD709
0Z4	—	—
054V	—	41MXP
1A3	DA90	1D13
1A4E	—	—
1A4P	—	—
1A5GT	—	—
1A7G	—	X14
1A7GT	DL32	—
1A7VG	DK32	X14
1AB6	DK96	1C3
1AC6	DK92	X18, 1C2
1AH5	DAF96	1FD1, ZD25
1AJ4	DF96	1F1, W25
1AN5	DF97	—
1C1(*TH-AEI*)	DK91	X17, 1R5
1C2	DK92	X18, 1AC6
1C5G, 1C5GT	DL35	—
	1C5G	
1D5	—	40SUA
1D6	—	—
1D7G	—	—
1D13	DA90	1A3
1E5G	—	—
1F1	DF96	1AJ4, W25
1F2	DF92	1L4
1F3	DF91	W17, 1T4
1F4	—	—
1F5G	—	—
1FD9	DAF91	ZD17, 1S5
1H5G	DAC32 (C1)	HD14
	1H5G	
1H5GT	DAC32 (C1)	—
1H6G	—	—
1L4	DF92	1F2
1LA6E	—	—
1LD5	—	—
1LH4	—	—
1LN5	—	—
1M3	DM70	—
1N5G	1N5G	Z14
1N5GT	DF33	—
1N5VG	DF33	Z14
1P10	DL92	N17, 3S4

Type	Mullard Direct Equivalent	Other Equivalents
1P11	DL94	N19, 3V4
1Q5GT	—	—
1R5	DK91	X17, 1C1(*TH-AEI*)
1S2	DY86	1S2A, DY87
1S2A	DY87	—
1S4	—	—
1S5	DAF91	ZD17, 1FD9
1T2	—	R16
1T4	DF91	W17, 1F3
1T5GT	—	—
1U4	—	—
1U5	—	—
2-AD140	2-AD140	—
2D2	—	—
2D4	—	—
2D4A	—	DDL4
2D4B	—	—
2D13, 2D13A	—	—
2D13C	—	—
2J2	U26/KY80	KY80, U26, U49, R20
2L2	U251KY50	KY50, U25, U47
2–OA79	2–OA79	—
2–OC26	2–OC26	—
2–OC72	2–OC72	—
2–OC74	2–OC74	—
2P	—	—
2XP	—	—
3/1	—	—
3/2	—	—
3/3	—	—
3/4	—	—
3/5	—	—
3/6A	—	—
3/16	—	—
3/18	—	—
3/20	—	—
3/31	—	—
3/32	—	—
3A4	DL93	—
3A5	DCC90	—
3C4	DL96	1P1
3D6	—	—
3NP4	MW6–2	—
3O4	—	N18

Type	Mullard Direct Equivalent	Other Equivalents
3Q5G } { 3Q5GT } {	DL33 / 3Q5GT	N16
3S4	DL92	N17, 1P10
3V4	DL94	N19, 1P11
4/13	—	—
4/14	—	—
4/14G	—	—
4/15	—	—
4/15G	—	—
4/100BU	FW4–500	U18/20
4CM4	PC86	—
4D1	—	—
4DL4	PC88	—
4FY5	PC97	—
4THA	—	—
4TPB	—	—
4TSA	—	—
4TSP	—	—
4XP	—	LP4, PP3/250, PX4
5/2	—	—
5/2T	—	—
5/3	—	—
5/3T	—	—
5AQ4	GZ32	—
5AR4	GZ34	—
5U4G	5U4G	U52
5V4G	5V4G	—
5X4G	—	—
5Y3G/GT	5Y3G/GT	U50
5Y4G	—	—
5Z3	—	—
5Z4 } { 5Z4G } {	GZ30 / 5Z4GT	—
5Z4GT	{ GZ30 / 5Z4GT	—
6/5	—	—
6/6	—	—
6/7	—	—
6A6	—	—
6A7	—	—
6A8G	6A8G	X63
6A8GT	—	—
6AB7	—	—
6AB8	ECL80	LN152, 63TP
6AC7	—	—

Type	Mullard Direct Equivalent	Other Equivalents
6AD8	—	—
6AG6G	EL33	KT61
6AJ8	ECH81	X719, 6C12
6AK6	—	—
6AK8	EACB80	DH719, 6LD12, 6T8
6AN7	—	—
6AQ4	EC91	6L34
6AQ5	EL90	N727
6AQ8	ECC85	B719, 6L12
6AS5	—	—
6AS7G	—	A1834
6AT6	EBC90	DH77
6AU6	EF94	—
6AV4	—	—
6AV6	EBC91	—
6B7	—	—
6B8G	—	—
6B8GT	—	—
6BA6	EF93	W727
6BD7A	EBC81	6LD13
6BE6	EK90	X727
6BG6G	—	—
6BH6	—	—
6BJ5	—	N78
6BJ6	—	—
6BL8	ECF80	—
6BM8	ECL82	—
6BN5	EL85	—
6BQ5	EL84	N709, 6P15
6BR5	—	65ME
6BR7	—	—
6BT4	EZ40	U150, UU9, 66KU
6BW6	—	—
6BW7	—	—
6BX6	EF80	Z152, Z719, 64SPT
6BY7	EF85	W719, 6F19
6C4	EC90	L77
6C5G	—	—
6C5GT	—	—
6C6	—	—
6C9	—	—
6C11	—	—
6C16	ECF80	6BL8
6C31	—	—
6CA4	EZ81	U709, UU12

Type	Mullard Direct Equivalent	Other Equivalents
6CA7	EL34	—
6CD6G	—	—
6CD7	EM34	—
6CJ5	EF41	—
6CJ6	EL81	—
6CK5	EL41	—
6CK6	EL83	—
6CM5	EL36	—
6CN6	EL38	—
6CQ6	EF92	9D6, W77, 6F21
6CS6	EH90	—
6CT7	EAF42	—
6CU7	ECH42	—
6CV7	EBC41	DH150, 62DDT
6CW7	ECC84	6L16
6D1(*TH-AEI*)	EA50	SD61
6D3	—	—
6D6	—	—
6DA5	EM81	—
6DA6	EF89	—
6DC8	EBF89	6FD12
6DJ8	ECC88	—
6DL5	EL95	—
6DR8	EBF83	—
6DS8	ECH83	—
6E5GT	—	—
6E8G	ECH35†	—
6EH7	EF183	6F29
6EJ7	EF184	6F30
6EL7	6F23/EF812	EF812, 6F23, Z749
6ER5	EC95	—
6ES6	EF97	—
6ET6	EF98	—
6F1	—	—
6F5G	—	H63
6F6G	6F6G	KT63
6F8G	—	—
6F11	—	—
6F13	—	—
6F14	—	—
6F15	—	—
6F16	EF41	62VP
6F17	—	—
6F18	—	W739
6F21	EF92	VP6, W77, 6CQ6, 9D6

Type	Mullard Direct Equivalent	Other Equivalents
6F22	EF86	Z729, 6267
6F24	—	—
6F25	—	—
6F27	—	—
6F28	—	—
6F32	—	—
6F33	—	—
6FG6	EM84	—
6G5G	—	6M1
6GA8	6/30L2/ECC804	B729, 6/30L2
6H6G	EB34†	D63
6H6GT	EB34†	—
6HU6	EM87	—
6J5G	6J5G	L63
6J5GT	6J5GT	—
6J6	ECC91	—
6J7G	—	Z63
6J7GT	—	—
6J8G	—	—
6JX8	ECH84	—
6K5G	—	—
6K6G	—	—
6K7G	—	—
6K7GT	—	—
6K8G	—	—
6K8GT	6K8GT	—
6K25	—	—
6L1	—	—
6L6G	—	—
6L7G	—	—
6L15	—	—
6L16	ECC84	6CW7
6L18	—	—
6L19	—	—
6L34	EC91	—
6LD20	—	—
6M1	—	63ME
6M2	—	—
6M6G	EL33	KT61, 6AG6G
6N6G	—	—
6N7GT	—	—
6N8	EBF80	WD709, ZD152
6P1	—	—
6P8G	ECH35†	—
6P25	—	KT61

Type	Mullard Direct Equivalent	Other Equivalents
6P26	—	—
6P28	—	—
6Q7G	—	DH63
6Q7GT	6Q7GT	—
6R3	EY81	—
6R6G	—	—
6R7G	—	DL63
6S2	EY86	—
6SA7	—	—
6SC7	—	—
6SC7GT	—	—
6SG7	—	—
6SH7	—	—
6SJ7	—	—
6SJ7GT	—	—
6SK7GT	6SK7GT	—
6SL7GT	ECC35†	—
6SN7GT	6SN7GT	B65
6SQ7GT	—	—
6SS7	—	—
6T8	EABC80	DH719, 6AK8
6U4GT	—	—
6U5/6G5	—	—
6U5G	—	6M1, 63ME
6U7G	—	—
6U8	ECF82	—
6V4	EZ80	—
6V6G	6V6G	—
6V6GT	6V6GT	—
6W2	—	—
6W7G	—	—
6X2	EY51	R12, SU61, U43, U151
6X4	EZ90	U78
6X5G	EZ35	—
6X5G	6X5GT	—
6ZY5G	—	—
7A2	—	—
7A3	PENA4	AC2PEN, KT41; PT4(*F*), 42MP/PEN
7A4	—	—
7A7	—	—
7A8	—	—
7AN7	PCC84	B319, 30L1
7B5	—	—
7B6	—	DH81
7B7	—	—

Type	Mullard Direct Equivalent	Other Equivalents
7B8	—	—
7C5	—	—
7C6	—	DH149
7D3	—	—
7D6	—	—
7D8	—	—
7D9	EL91	N77, N144, 6AM5
7D10	EL821	6CH6
7DJ8	PCC88	—
7ED7	30F5/PF818	30F5, Z329
7EK7	30L15/PCC805	B349, 30L15
7ES8	PCC189	—
7F7	—	—
7F16	EF41	—
7FC7	PCC89	—
7H7	—	—
7K7	—	—
7N7	—	—
7Q7	—	—
7R7	—	—
7S7	—	—
7Y4	—	U82
7Z4	—	—
8A1	—	MSP4, MS/PEN, SPT4A
8A8	PCF80	LZ319, 30C1, LZ329, 9A8
8D2	—	13SPA
8D8	EF86†	—
8HG8	PCF86	—
9A1	—	MVS/PEN
9A8	PCF80	LZ319, LZ329, 8A8, 30C1
9AK8	PABC80	—
9AQ8	PCC85	—
9BW6	—	—
9D2	—	VP1322, 13VPA
9D7	—	—
9EN7	30C15/PCF800	LZ339, 30C15
9GB8	30FL1/PCE800	LN339, 30FL1
9JW8	PCF802	—
9U8	PCF82	—
10C1	—	X118, X145
10C2	—	—
10D1	—	—
10D2	—	—
10F1	—	Z145
10F3	—	—

Type	Mullard Direct Equivalent	Other Equivalents
10F9	—	W145
10F18	—	W119
10L1	—	—
10LD11	—	DL145
10M1	—	—
10M2	—	—
10P13	—	N145
10P14	—	—
11A2	—	AC/HL/DD, DDMHD4
11D3	—	—
11D5	—	—
12A6	—	—
12AC5	UF41	—
12AC6	—	—
12AD6	—	—
12AE6	—	—
12AH7	—	—
12AH8	—	—
12AT6	HBC90	—
12AV6	HBC91	—
12BA6	HF93	—
12BE6	HK90	—
12BH7	—	—
12BL6	—	—
12C8GT	—	—
12FB5	30P12/PL801	N369, 30P12
12J7GT	12J7GT	—
12K5	—	—
12K7GT	12K7GT	—
12K8GT	—	—
12Q7GT	12Q7GT	—
12S7	UAF42	—
12SA7GT	—	—
12SC7	—	—
12SJ7GT	—	—
12SK7GT	12SK7GT	—
12SL7GT	—	—
12SN7GT	12SN7GT	B36
12SQ7GT	—	—
12SR7	—	—
12U5G	—	—
12XP4	MW31–74	C12FM, 121K
12XP4A	MW31–74	121K
12Z3	—	—
13GC8	30PLI/PCL801	LN319, 30PLI

Type	Mullard Direct Equivalent	Other Equivalents
13PGA	—	—
13SPA	—	8D2
13VPA	—	VP1322, 9D2
14ABP4	AW36–20	—
14ABP4A	AW36–20	—
14AHP4A	AW36–80	—
14B6	—	—
14GW8	PCL86	—
14H7	—	—
14K7	UCH42	X142, 141TH
14KP4	MW36–24	141K, C36–24, 14LP4
14KP4A	MW36–24	141K, C36–24, 14LP4
14L7	UBC41	19LD3, DH142
14LP4	MW36–24	141K, C36–24, 14KP4
14R7	—	—
14S7	—	—
14XP4A	—	—
15	—	—
15A2	—	MX40, 41MPG
15A6	PL83	N153, N309
15CW5	PL84	N379, 30P18
15D1	—	—
15D2	—	—
15DQ8	PCL84	—
15EP4	—	—
16A5	PL82	N154, N329, 30P16
16A8	PCL82	—
16GK8	30PL13/PCL800	30PL13, PCL800
17ARP4	—	171K
17ASP4	—	171K
17AXP4	—	171K
17BQP4	MW43–69	—
17BTP4	AW43–80	—
17C8	UBF80	171DDP
17CVP4	AW43–88	C17AA
17Z3	PY81	U153
18	—	—
18D2	—	—
18D3	—	—
18GV8	PCL85	—
19AQ5	—	—
19BG6G	—	—
19CS4	U191/PY301	U191, U339, PY301
19D8	UCH81	10C14, X119
19FL8	UBF89	WD119, 10FD12

Type	Mullard Direct Equivalent	Other Equivalents
19SU	PY82	U154, U319, U192, 19Y3
19T8	—	—
19X3	PY80	U152, U309
19Y3	PY82	U154, U319, U192, 19SU
20A1	—	X41, 41STH
20D1	—	—
20D2	—	—
20D4	—	—
20F2	—	—
20L1	—	—
20P1	—	—
20P2	—	—
20P3	—	—
20P4	20P4/CL30	CL30
20P5	—	—
21A6	PL81	N152, N359
21CJP4	MW53–20	—
21CLP4	AW53–80	—
25A6G	25A6G	—
25E5	PL36	—
25L6GT	25L6GT	KT32
25RE	—	—
25U4GT	—	—
25Y5	—	—
25Z4G	25Z4G	—
25Z4GT	25Z4G	—
25Z5	—	—
25Z6GT	—	—
27GB5	PL500	—
27SU	—	—
30AE3	PY88	—
30C13	—	—
30C17	—	—
30F27	—	—
30FL12	—	PCE82
30FL13	—	—
30L17	—	PCC806
30P4	—	N308
30P14	—	—
31A3	UY41	U142, 311SU
35A5	—	—
35L6GT	—	—
35RE	—	—
35W4	HY90	—
35Z3	—	—

Type	Mullard Direct Equivalent	Other Equivalents
35Z5GT	35Z5GT	—
36	—	—
38A3	UY85	U119, U381
39/44	—	—
40SUA	—	U4020, 1D5
41E	—	—
41FP	—	—
41MH	—	AC2HL
41MHF	—	41MHL
41MHL	—	—
41MP	—	—
41MPG	FC4	MX40, VHT4, 15A2
41MPL	—	—
41MPT	—	—
41MSG	—	MS/PEN, SPT4A
41MTA	—	41MTL
41MTL	—	—
41MTS	—	—
41MXP	—	—
41STH	—	—
42	42	—
42/42E	—	—
42MP/PEN	PENA4	AC2PEN, KT41, PT4(*F*), 7A3
42MPT	—	—
42OT	PENA4	AC2PEN, KT41, 42MP/PEN
42OT/DD	—	AC2PENDD
42PTB	—	—
42SPT	—	–
43 / 43E	43	—
43IU	—	MU14, R2, UU5
44IU	IW4–500	MU14, R3, UU5
45A5	UL41	—
45B5	UL84	10P18, N119
45IU	—	—
50A5	—	—
50B5	—	—
50BM8	UCL82	LN119, 10PL12
50C5	HL92	—
50CD6G	—	—
50L6GT	50L6GT	KT71
52KU	—	—
53KU	GZ37	U54
54KU	GZ32	—
61BT	—	—

Type	Mullard Direct Equivalent	Other Equivalents
61SPT	—	—
62BT	—	—
62DDT	EBC41	DH150, 6LD3
62TH	ECH42	X150, 6C10
62VP	EF41	W150
63ME	—	Y63, 6M1
63SPT	EF50	—
63TP	ECL80	—
64ME	EM34	6M2
64SPT	EF80	Z152, Z719, 6BX6
65K	—	—
65K/2	—	—
65ME	—	—
66KU	EZ40	U150, UU9, 6BJ4
67PT	EL41	N150
75	—	—
75K	—	—
76	—	—
77/77E	—	—
78/78E	—	—
79	—	—
80	80	—
83	—	—
83V	—	—
84/6Z4	—	—
85K	—	—
105K	—	—
108K	—	—
112K	—	—
121K	MW31–74	C12FM
121VP	UF41	—
141DDT	UBC41	10LD3, 14L7, DH142
141K	MW36–24	14KP4A, C36–24, 14LP4
141TH	UCH42	X142, 14K7
142BT	—	—
154V	—	MHL4
164V	—	MHL4
171DDP	UBF80	17C8
171K	—	17ASP4
172K	MW43–69	—
173K	MW43–69	—
185BT	—	—
185BTA	—	—
202DDT	—	—
202STH	—	TH2321

Type	Mullard Direct Equivalent	Other Equivalents
202VP	—	—
202VPB	—	—
203THA	—	—
210DDT	—	HD2
210DET	—	210HF
210HF	—	—
210HL	—	210HF
210HPT	—	—
210LF	—	—
210PG	—	X22
210RC	—	—
210SPG	—	—
210SPT	—	Z22
210VPA	—	—
210VPT	—	W21
212K	MW53–80	—
215P	—	—
215SG	—	Z21
220B	—	—
220HPT	—	KT2, PT2, 220OT
220OT	—	KT2, PT2
220P	—	—
220PA	—	L2
220PT	—	—
220SG	—	Z21, 215SG
220TH	—	X24
220Vs	—	VS2, W21
220VSG	—	VS2, W21, 210VPT
225DU	—	—
230PT	—	—
230XP	—	—
240QP	—	—
244V	—	MH4
302THA	—	TH2321
311SU	UY41	U142, 31A3
332PEN	CL33	—
345V	—	AC/HL, MH4
402P	—	—
402PEN	—	—
402PENA	—	—
405BU	—	—
408BU	—	506BU, 1821
442BU	DW4–350	R2, U14, UU5
451PT	UL41	N142
460BU	DW4–500	R3, U14, UU5, 1561

Type	Mullard Direct Equivalent	Other Equivalents
484V	—	—
506BU	—	U10, 1821
904V	—	—
994V	—	—
1561	DW4–500	U14
1629	—	—
1821	—	U10
1861	IW4–500	MU14
1867	IW4–350	MU14, R42
1877	—	—
1881	—	—
2101	—	—
2102	—	—
6153T	—	—
6267	EF86	Z729, 6F22
6504A	—	—
6505A	—	—
6506A	—	—
6703A	—	—
6704A	—	—
6705A	—	—
6706A	—	—
6801A	—	—
6802A	—	—
6901A	—	—
7101A	—	—
7102A	—	—
7201A	—	—
7202	—	—
7203A	—	—
7204	—	—
7204A	—	CRM144
7205A	—	CME1402
7401	—	—
7404A	—	CRM172
7405A	—	CME1703
7406A	—	CME1705
7501A	—	—
7502A	—	CRM212
7503A	—	CME2101
7504A	—	—
7601A	—	CME1901
7701A	—	AW59–95, CME2301

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